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Price and Value

THE profitable field for domestic electrification among weekly-wage earners is common ground for those directly interested in the sale of electricity and appliances and for those whose approach is from the side of social progress. It formed the dominant theme of the conference of the Electrical Association for Women from the outset, when Mrs. Gregory and others at the general meeting urged the need for electricity to be supplied at an economic rate to the less well-off members of the community.

We are glad that Sir William Ray, in defending the attitude of supply undertakings in this connection, took so happy an example as Liverpool, even if it might appear to be an argument from the particular to the general. Liverpool has set an example which will, we believe, be regarded as a standard for emulation by other undertakings now that the grid has made a low secondary charge general. It is even more to the point that Mr. P. J. Robinson, the city electrical engineer, expects to make considerable reductions in the retail secondary charge (which is now 0.5d. per kWh) as the use of electricity increases in his area.

Such reductions will not, presumably, come from economies in generation due to increased output, since there is not much room for improvement there; nor so much from the effect of higher load factors on distribution charges as from improved diversity of demand. This increased diversity is to be expected from a greater variety of applications, and not only as between individual consumers of one class.

In emphasising that cheap electricity in the home depended upon its increased use for industrial, commercial and traction purposes, Sir William only expressed what is a commonplace among engineers; but it is not always appreciated by the public that, if lighting only were supplied, the steam turbine and the transformer (the two essential factors in low costs of production) would find little scope.

Probably we hear too much of price, which is not the only factor in development. Free electricity would not help the larger proportion of our potential consumers, who could not afford to buy the heavier domestic apparatus even on deferred-payment terms. It has been said that ability to distinguish between price and value marks a civilised people, and it is the value of electrical service, rather than the price of the unit, that is of ultimate importance.

The public must be able to obtain apparatus on simple hire and also to rely on quick maintenance service; it must be educated (*e.g.*, by the E.A.W.) to overcome the fear of electricity due to ignorance, which Sir William Crawford, speaking as an outside observer, referred to as one of the greatest obstacles to its wider use; and it must have a supply available everywhere at a standard voltage.

Only when these conditions have been fulfilled will the full value of electricity become apparent to all. The industry would do well to wean the minds of the public from discussions on the price of electricity to a proper appreciation of its value as a service.

Railway Electrification

ONE of the chief points in the speech of Mr. G. H. Nelson at this week's meeting of the English Electric Co. concerned the value of co-operation between that company and the Metropolitan-Vickers Co. in the railway electrification field. The motors for the latest extensions of the Southern Railway will be supplied by the former company, but at the request of the railway authorities they are to be interchangeable with their existing motors of Met.-Vickers design. An agreement has been entered into by the companies to this end. Mr. Nelson expressed the view that the action along these lines between manufacturers would do much to encourage further railway electrification in this country. Interchangeability of stock is a fundamental necessity of railway operation. The Polish State Railway contract in which the two companies are interested was the result of patient and difficult negotiations extending over two years. How important it is to take a long view in such matters is seen when it is remarked that this very large order

is the outcome of a connection with Poland which began more than ten years ago. A tribute was paid by the speaker to the help and advice which had been given unstintingly by the Export Credits and other Government Departments in arranging the financing of a £2,000,000 undertaking during the world crisis.

Deferred Profits on Big Contracts

An increased proportion of orders on the books is a welcome sign of revival and increases employment at once if the share of new business is sufficient to absorb the minimum overhead charges necessary to keep a large technical organisation intact. The investor, however, can hardly expect to benefit if ruling prices are below the cost of production, and it is the necessity for co-operation to bring this state of things to an end upon which several of our large companies are in agreement. It was as well for Mr. Nelson to mention that large contracts booked during the last six months or so may not yield revenue or profit until after the 1934 accounts are closed. Smaller products which are more quickly made and sold are in a different category.

Fire Hazards

Fires that can be ascribed to electrical origin form so small a fraction of the total that our insurance societies have not found it worth while to investigate the risks closely. This attitude is supported by figures compiled by the National Board of Fire Underwriters in America, which show that of the recorded monetary losses by fire only 3.7 per cent. are attributable to electricity—not one-sixth of that due to matches and smoking. We should expect the proportion to be even less in Great Britain. The main causes of electrical fires are said to be poor installation work and appliances and carelessness in their use; apart from differences in standards, the use of small apparatus is not so widespread among our population. Taking into account the cost of fires that would have occurred if electricity were not employed, there is surely a very large credit balance in our favour.

Oil Engines as Load Builders

By transferring oil engines from power-stations now supplied by the Northern Ireland Grid to outlying areas, the Electricity Board gives consumers the advantages of supply from the system in advance of construction. At Omagh, in County Tyrone, where the electricity undertaking was acquired by the Board at the end of 1932, the consumption is now about 160 per cent. greater than it was at this time last year, and the load factor has been raised from 29 to 42 per cent. This result is due to active encouragement of the cooking load, so that out of 169 residential consumers no fewer than 100 cook by electricity. Mr. C. R. Westlake, the Board's chief engineer and manager, expects the rate of progress to justify the erection of a transmission line before the end of the present year. Meanwhile, the population is becoming electrically educated. We have often advocated the use of small generating units in this way; the example cited shows that the method can be successful in practice.

"Sumer is I'cumen In"

Although there will be no Summer Meeting of the Institution of Electrical Engineers this year, the Western Centre is having its usual long week-end next month, a great feature of which is golf and a total abstention from (official) technical discussions. The London Students are enterprising in their plan of going to the Ruhr district of Germany (in July) with the definite intention of visiting works on the way. Prior to that they are to hold a summer outing (in June) which will also be serious, in its main aspect at any rate, as the day will be devoted to a tour of the electrified portion of the Southern Railway. While the proposals of the two offspring are as commendable as the result will no doubt be enjoyable, we think the parent body is well advised to miss the summer programme this year. The lack of enthusiasm noticeable on recent occasions indicates that its members find too heavy the claims of various conventions on their time. Matters for later years are, we suppose, in the melting-pot. The general programme of electrical events of this summer will open with the Liverpool Convention of the I.M.E.A., commencing on May 28, the gatherings of the Tramways, Light Railways and Transport Association at Southend, and the Electrical Contractors' Association at Buxton, following in June. Another year may bring forth the much-desired meeting of a number of these organisations in one National Convention. We hope that the various bodies concerned will soon be conferring regarding the details.

Example and Precept

The arrangements for centralised supervision of the South-East England and East England grid, one of the largest interconnected systems in the world, carry automatic remote indication to considerable limits. Major operations are still performed at local points under telephonic instructions, but there would appear to be little difficulty in adapting the flexible system employed to such duties as tap changing and switch opening and closing from the Bankside centre. We should like to see an experimental scheme on these lines. A fundamental factor in the control system is rapid and efficient communication. The decison of the Central Electricity Board to employ Post Office lines (which influenced the location of the control room) is something more than a tribute to the reliability of our telephone service. It follows logically from the nature of the Central Board itself that it should use a public in preference to a private system when it is as economical to do so, and example is better than precept.

A Restoration

It is doubtful whether the "cuts" made in wages in the electricity supply industry two years ago had any effect upon the price of electricity, but "cuts" were in the air, and the industry apparently had to fall in line with the rest. Now, we are glad to hear, the payment to men employed in power-stations and distribution systems is to be restored to its former level next month. The cost of this is said to amount to £180,000 a year, which is a very small proportion of the total working costs, and an inexpensive way of maintaining content in the prosperous electricity supply business—a most important matter.

Alternators as Motors

The closing down of small generating stations, combined with water shortage, suggests the question of whether the displaced alternators can be used as motors for driving pumps for local schemes. Although a synchronous motor is, so to speak, the converse of an alternator, successful conversion may not be simple. Unless the machine is of old design with solid poles, or is already fitted with damping windings on the pole faces, the starting torque of about 20 per cent. and pull-in torque of 40 per cent. required will not be obtained without the fitting of an amortisseur, which needs careful designing to suit the conditions. Damping would also probably be necessary to prevent hunting. Again, the starter windings may not be rigid enough to stand the shock of starting at a voltage of, say, 75 per cent. of the full value. Alternatively, the machine could be run up by a pony motor and synchronised, but this would, in most cases, be an expensive solution. Pumping provides one of the easiest loads, but the suitability of a small alternator for the purpose is largely a question of initial design.

An Impossible Suggestion

In the House of Commons, on Tuesday, Mr. Leckie suggested that some "pungent or disagreeable chemical agent" should be introduced into domestic gas to discourage suicides. This surely would savour of an attempt to gild the lily or adorn the rose. If suicides like gas as it is, nothing will stop them using it.

Personalities at last week's Conference of the Electrical Association for Women (see page 593)

(1) Lady Moir (president) presents the Membership Cup to Mrs. Hutchinson. (2) Delegates hear of progress in domestic electrification. (3) Miss C. Haslett, Director, reports recent developments. (4) Mr. P. P. Wheelwright, Mrs. F. H. Corson, Mr. and Mr. David Wilson. (5) The Viscountess Elibank. (6) Diploma winners: The Misses K. R. Asquith, J. Mackirdy, M. M. Andrews, M. Caughie, B. Dimmack, I. Bennet, H. Shaw, and M. J. Gilbert. (7) Interest is shown in accurate time keeping. (8) The Lady Mayoress of Bradford (Mrs. A. W. Brown) and some delegates. (9) Dr. S. L. Pearce receives the E.A.W. at Battersea power station. (10) Mrs. H. Baker, Councillor Mrs. F. W. A. Cushman, and Miss P. Rentell. (11) Mr. W. F. Coaker, Mrs. Leete, Mrs. Coaker, and Mr. E. Leete. (12) Inspecting one of the 65,000-kW sets. (13) The Reception: Lady Snell, Mrs. G. Z. de Ferranti, the Dowager Lady Swaythling and Margaret Lady Moir. (14) At the Building Centre

Boiling Plates. By L. V. Turner, A.M.I.E.E.*

A comparison of types

IN letters and articles which have appeared of late in the ELECTRICAL REVIEW with reference to boiling plates, arguments have been advanced in favour of: (1) the solid type plate when used with special utensils; (2) the tubular-type or sheathed-wire hot plate; and (3) the low-voltage radiant hot plate.

The first requisite of a boiling plate, in my opinion, is speed; life comes second and efficiency third. The electric cooker has been labelled slow by the opposition; the trouble has not been in either the oven or the grill, but in the hot-plate, with the result that electric cooking as a whole has been hampered by this component.

When consumers have been persuaded to try an electric cooker it is fatal to give them an opportunity of complaining of or comparing the speed of boiling to the disadvantage of electricity or of installing a gas ring alongside the electric cooker, which some of us know to have been done. Speed of boiling is a factor to which the user's attention is constantly attracted.

Nearly all of the modern boiling plates have been improved to such an extent that they can be now called reliable. Many are guaranteed with a two years' life, but in practice this does not always work out. However, reliability has outstripped speed, and if attention has to be called to a boiling plate only once in two years, I do not think the average consumer will grumble.

Efficiency Last!

Efficiency should, I consider, rightly come last in the order of requirements, and not first as a number of boiling plate manufacturers would have. What does the consumer know or care about the thermal efficiency of the boiling plate so long as it does its work quickly and well, and gives no trouble? It will be remarked "But he will care at the end of the quarter when he gets his bill." My reply to this is that the difference in efficiencies between the three main types of boiling plates now being fitted to cookers is so small that it would be impossible, or at least very difficult, to determine this difference in a consumer's account.

Claims for 60 per cent. efficiency are made for some types of boiling plates, but I suspect that in some cases the working efficiency is only about half this figure. I do not suggest that 60 per cent. cannot be obtained, but I do say that it cannot be maintained by the ordinary consumer.

To get the best efficiency with an enclosed plate the utensil must have a perfectly machined bottom surface, and must also be of the right size to cover the plate. Again, the shape of the plate affects the efficiency. With the radiant-type plate, the surface of the bottom of the utensil matters, whether polished or black. The time taken in boiling or the quantity of water boiled are other important factors. Some manufacturers prefer to specify three pints when giving efficiency figures, but my experience is that something less than this is the average quantity of water boiled at a time by the ordinary householder. Laboratory efficiency figures may be misleading; the test figures and curves given here were taken as nearly as possible under average circumstances.

The Enclosed Type

Since the introduction of the enclosed type of plate as now manufactured (that is one with the heating coil or resistor embedded in an insulating cement in cast iron) great strides have been made in improving its speed, weight, efficiency and life, and the enclosed plate has undoubtedly proved a very valuable aid to the development of cooking load. I suggest, however, that the success to which it has attained is on the wane for the following reasons: (a) the need for special utensils; (b) distortion of the special utensils; (c) the inability of the boiling plate to maintain its surface; (d) the advent of other types of boiling plates; and (e) slowness of first boil with small quantities of water.

Even the most ardent advocate of the enclosed plate will admit that special utensils having heavy flat bottoms are necessary to obtain satisfactory results, and I have found that many consumers have refrained from, or at least have postponed, installing an electric cooker on account of the need to purchase a new set of cooking utensils. I also know that consumers are considerably relieved when they learn this is unnecessary when using the radiant type plate.

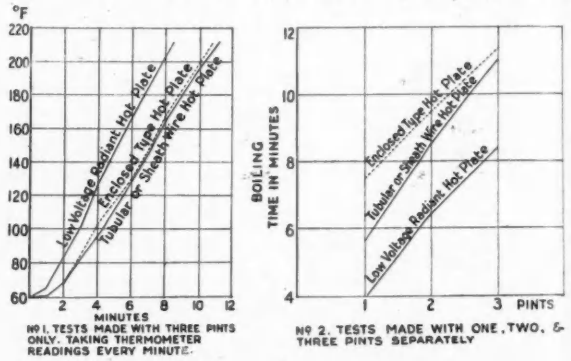
Few of the special utensils sold maintain without distortion their flat surfaces. Also, I am afraid, this is applicable to the boiling plate itself. Out of half a dozen examined that had been in service for some time, only one had anything like a reasonable flat surface. Distortion, cracks and flaking lessen the conduction of heat from hotplate to utensil, on which this type of plate almost entirely depends.

Radiant-type plates have, it seems to me, put the enclosed type of plate a little in the shade. Many cookers are now fitted with one enclosed and one radiant plate, which surely is a step in the right direction. There is no question that the enclosed plate is slow on the first boil, and also when used with small quantities of water, as a glance at the curves will show. When the tests were taken every endeavour was made not to favour one type of plate more than another; also new boiling plates were taken in each case, but *not* special ones.

Tubular or Sheathed-wire Patterns

This type of plate is generally regarded as a "radiant" plate and is somewhat similar to the low-voltage radiant plate, but runs at the standard voltage. Vessels can be placed on or in contact with the hot tube and therefore receive some heat by conduction. This plate has a psychological appeal to the consumer as it has a brightly glowing element and the surface temperature is high, the heat being also transmitted to the vessel by radiation as well as conduction; in fact, the predominating factor in heat transference from plate to utensil is the absorption coefficient of the bottom of the utensil.

If the utensils are of aluminium or polished metal the bottoms should be blackened, as this increases the speed and



No 1. TESTS MADE WITH THREE PINTS ONLY. TAKING THERMOMETER READINGS EVERY MINUTE.

No 2. TESTS MADE WITH ONE, TWO, & THREE PINTS SEPARATELY

Results of tests with boiling plates of different patterns

efficiency. One of your correspondents obtained a 30 per cent. increase of speed by blackening the bottom of the utensil, but I have never been able to attain this figure. The average increase in efficiency, as far as my experience goes, is between 8 per cent. and 10 per cent. The utensils do in time get dulled with use, but it is far better to give the bottoms of all bright pans a coating of "Bastalite," which is very good for the purpose and lasts a considerable time. Ordinary vitreous enamelled pans are excellent for use with the radiant type plate and this is a point in its favour, as the average household usually contains a number of these.

Low Voltage Open Plates

This, again, is a radiant type of plate and employs a transformer to reduce the standard pressure to about 10 V, the resistor taking about 200 A. This plate has a number of advantages, including greater speed, and one disadvantage—that of price. On the first boil and with small quantities of water this plate is considerably ahead of any other (see curves). The almost white hot resistor has an appeal to the housewife which cannot be ignored. It responds to the switch with hardly any time lag in the temperature, having almost the sensitivity of a gas ring. For boiling small quantities it is more efficient than any other type; and efficiencies in boiling plates must be taken only in conjunction with the variety of details that go to make up the test.

Owing to the low secondary transformer voltage it is shock-proof, and the resistor or ribbon is of a very large cross sectional area, making it very robust and giving the plate a long life. Even if the resistor does fail it should be extremely simple and cheap to renew. Spillings do not affect it, and the remarks concerning utensils made with reference to the tubular sheathed wire hotplate apply equally to the low-voltage open type.

To sum up: the low-voltage hotplate is certainly the speediest. It is difficult to state definitely which has the longer life at the moment—the enclosed type plate or the low-voltage open plate—but I would say the odds were in favour of the latter. Broadly speaking, there is little to choose in efficiency between the various plates at present manufactured, but the tubular sheathed wire hotplate appears to lead a little when not less than two pints of water are boiled.

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Wiring for Rural Installations. By T. C. Gilbert, A.M.I.E.E.

The search for a suitable system

THERE is little doubt that the commoner wiring systems developed for factories, offices and shops in towns exhibit serious shortcomings when applied to rural installations, and it would now appear necessary to devise a system for the farm, designed to meet the very exacting conditions at a reasonable cost.

What are the conditions militating against the successful use of existing systems? For one thing, dampness seems to be inseparable from most farm buildings, whilst the chemical effects of manures and other farm stores introduce further complications. Insects and other pests provide their quota, especially on poultry farms, whilst the heat given out by animals, especially noticeable in a crowded pig shed, also assists in bringing to light the defects of the average wiring system. There is also the necessity for frequent runs from building to building, often over fairly long distances, and with most existing systems this entails considerable expense.

Heavy-gauge screwed conduits are usually inadmissible for the farm installation, mainly on the score of expense, although condensation troubles have their place in the general rejection of this otherwise excellent system. Light gauge conduits must be ruled out because of their extremely short life in farm buildings, in some cases the conduits disappearing after only a matter of months by reason of dampness and chemical action. This not only results in the loss of desirable mechanical protection for the cables, but also destroys the already precarious earth circuit.

Lead-covered and hard-metal sheathed cables are often unsuitable because of the chemical action so easily set up on their sheathings. On some of the more ancient farms old oak beams have robbed lead-covered cables of all pretence to a continuous sheathing within quite a short time, and such wiring systems are extremely vulnerable to mechanical damage. Hard-metal wiring systems rely upon soldered joints to their various accessories if continuity and damp-proofness is to be ensured, and are expensive, apart from chemical trouble.

The Most Suitable Cables

Cables with cab-tyre or the various "ite" sheathings, without further mechanical protection, have proved especially successful for farm wiring, being practically proof against damage and chemically inert. Contractors and others using these systems soon find that a lack of suitable accessories make their installation more or less a patchwork affair, whilst the leads are too heavy to swing across open spaces without catenary suspension. Very few problems arise during the installation of the wiring, but ironclad switches fitted with grip nipples designed for lead-covered cables may be often seen with cab-tyre wiring, or, alternatively, ordinary surface type bakelite switches mounted on wood blocks are used, all of which are quite unsuitable for the purpose. Ordinary bakelite switches are too liable to breakage, especially those with the screw-on type of cover (although the use of the type with the cover held by two captive screws is admissible); the use of ironclad switches, in the absence of any effective earthing facilities, cannot be permitted.

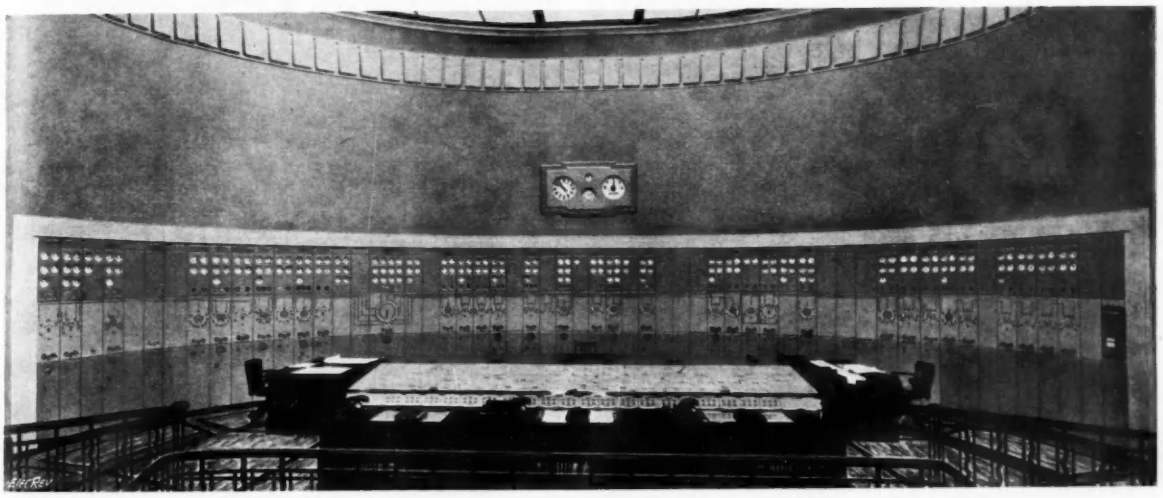
Similar difficulties and makeshifts are visible in the various attempts to utilise standard types of fuseboards with cab-tyre wiring systems; in some cases ironclad boards are employed, and in others the ordinary wood-cased board, which provides a nest for animals and insects. Neither pattern meets the case, nor can a really sound wiring job be built up round them.

I will make a few suggestions as to the development of a suitable wiring system for farm buildings, not entailing any great departure from established practice, but eliminating most of the present difficulties, and resulting in a system that should be lasting, efficient, and cheap.

All forms of metallic enclosures must be abandoned, not only on the score of condensation and chemical action, but also because of the practical difficulties in the way of ensuring their continuity and efficient earthing. Cab-tyre and "ite" cables will prove suitable for use with the ideal system, and no other forms of wiring will therefore be considered.

Solid Conductors Best

Owing to the fairly long spans that have to be covered, both inside and outside buildings (and these in the former case represent considerable expense if fixings have to be made every few inches) I would suggest that all conductors should be solid, and not stranded, and preferably composed of hard-drawn copper, phosphor-bronze or the like. This need not materially increase cost (especially as for purely lighting work a gauge less than the present standard would be sufficient), but would prove of great assistance where spans have to be made between buildings. With a high-tensile conductor it would only become necessary to provide a supporting bracket with insulators, whereas under present conditions, unless the interior wiring system is broken down to a proper overhead line, catenary wires, strainers and hangers have to be provided in addition. The general effect, too, would be to stiffen up the wiring system, and as sagging of the conductors would not be so pronounced fixings could be made at wider distances.



The control room of the S.E. and E. England Grid Schemes at Bankside, London, S.E. **(See page 592)**

Only single core cables, mounted upon standard or specially designed porcelain cleats, would be used. No junction boxes would be utilised and no wires looped, but all junctions would be made by soldered or mechanical tee joints to the main conductors, and insulated in the old-fashioned way with rubber or cloth tape, afterwards varnished over.

Such a method of installation would, when used for purely lighting purposes, leave only two single wires to enter lamp fittings and switches. The former should consist of a fitting similar to the existing bakelite batten holder, but of more robust construction, and with a skirt over the lamp cap. This should be backed with a bakelite box as an integral part of the fitting, provided with *external* fixing lugs, and complete with two gland entries for the single cables at one side, spaced apart a distance corresponding to the grooves in the special cleats used for supporting the cables. Where suspension fittings are required there would be three glands, one being designed to take the cab-tyre flexible to the holder, which will also require redesigning to suit our purpose. The glands could be of simple design, consisting of metal washers over a rubber ring, the whole compressed round the conductor by screwing in the outer threaded ring. A damp- and insect-proof joint can easily be made in this way, especially if assisted with a small quantity of wax or soft soap.

Switch boxes, whether single or multiple, would be constructed in the same way, but with the glands at the *bottom*. The conductors would then be brought down below the switch box and turned up into the two glands, forming drip loops for

any moisture that might find its way down the cables. The switches must be totally enclosed within the bakelite boxes, preferably with a strong turn handle at the side. The switch boxes should be adaptable in case it becomes necessary to make the glands come at the side or top for any purpose.

It should be possible to design a box that could be used for lighting fitting, plug or switch, by the simple interchange of the cover. The method advocated of jointing all cables would make for a standardised box, with only two glands, and this should ensure low costs for accessories. Ordinary switches of metal construction could be fitted inside such boxes, as these are usually so much stronger than the bakelite patterns. I would suggest that two grooves be left in the back of the box, so that the cables coming down to the switch and passing under to the glands would not have to travel *round* the switch box, but could be neatly tucked under, with some improvement as regards mechanical protection.

Plug boxes, or switch and plug boxes, could be constructed on the same lines, but these will be referred to later in more detail. Drip loops should be provided at *all* points, especially fuseboards and points of entry into buildings.

The Arrangement of Fuses

I would break away from the conventional grouping of fuses in some usually inaccessible position, and protect local lights by local fuses incorporated in the switch boxes. Something on the lines of the present small-capacity insulated switch-fuse or " splitter " is required, again with bottom entry by means of glands. With such a method there is never any doubt as to which fuses are blown, and only those affected need be made dead for renewal; the remainder of the lights in the building can be safely left on.

Modern methods of constructing simple 2- and 5-A cartridge fuses should enable a small and compact single- or double-pole switch fuse to be designed at small cost, as removable fuse bridges for wire would be unnecessary. With the main wiring in the form of a ring main running through the various buildings, one such small cartridge fuse could be placed in the light point and one in the switch, although for easy and quick renewal both should preferably be in the switch. With this method one grave menace to farm electrification is removed, which is the indiscriminate renewal of fuses with any sort of wire handy, and there is usually no lack of odd pieces of wire on the average farm.

Single-pole fusing on the phase wire only might receive consideration for farms, each individual light having its own fuse in the switch. The neutral could be covered by means of a double-pole switch-fuse where the supply enters the building, barn or stable; it will probably never blow, but will bring our installation within the Regulations, although there are rumours that such single-pole fusing may shortly be permissible. Where the fuse is incorporated in the switch it would probably be necessary to consider interlocking the cover with the switch handle, rendering it impossible to renew the fuse with the switch on.

The simple wiring system described should be equally suitable for interior or exterior use, although careful design of lighting fittings would be necessary. Cable boxes similar to those described have been in use for years with relay distribution systems without trouble, proving perfectly weatherproof whether used with lead-covered or tough-rubber cables. Further mechanical protection for wiring might in some cases be necessary where cables are brought down to switch points, but it is unnecessary to enclose the cables completely, as two wood battens, one on either side of the cables, afford all the protection necessary.

Earthing

I suggest that no attempt should be made to provide an earth circuit throughout the farm or through individual buildings. Where such apparatus is of the lighter variety (*e.g.*, milkers, vacuum cleaners, ultra-violet ray lamps) these should be supplied through small switch plugs fitted with earth leakage devices, such as are used in farms in Germany. In these special switch plugs a small release opens the switch when the leakage potential upon the connected apparatus reaches 20-30 V, or the leakage current to the earth electrode exceeds about 20 mA. The earth connections are simple and cheap, an effective earth being made by means of a small driven spike about 2 ft. long, situated immediately under, or near to, the switch plug. The resistance of such earth connections may be anything up to 500 ohms without detriment to the protection afforded, and the normal operation of the switch plug automatically tests this earth connection and the leakage trip. From the switch plug to the apparatus the usual three-core flexible conductor is employed.

For larger gear, such as motors up to any capacity, single or three-phase, a similar earth leakage release is fitted in the control gear, and a simple earth spike driven adjacent to the motor is sufficient to provide all the leakage protection necessary. Although the cost of such a device is higher than the corresponding control gear without leakage protection the absence of a complete and continuous earth circuit all over the farm should result in a final saving in cost.

Even when large sums have been spent in an effort to provide sound earth connections on farms, &c., they often prove to be completely ineffective. The simple method of providing apparently inefficient earth connections for local protection described has been proved on many thousands of installations abroad to provide complete protection against leakage potentials, which in their early stages have been so great a menace to cattle. It offers the advantages that the fitting of fuses of too large a capacity does not vitiate the protection as under present practice—and that a leakage potential on one device is not extended to all other points of the earth circuit, also as under present practice.

I am aware that wiring systems have been designed in this country for farm work, but they are, to my mind, too complicated and expensive. One or two Continental firms have developed wiring systems along the lines advocated, notably the A.C.E.C., whose " Charlebond " system is utilised extensively in Belgium. None of these completely fulfils our requirements, however, and none utilises switch and plug boxes with the glands at the bottom, thus enabling the use of drip loops, which, I consider, are essential on farm installations. As a parallel, I might point to the fact that practically all switches used in the Navy in exposed positions are provided with gunmetal glands at the bottom of the boxes, and also provide for the use of single cables; these might well serve as a pattern as to what we require for the rural installation, but in non-metallic construction.

A Submarine Direction Finder

THE Marconi Company has introduced a new wireless direction finding equipment for submarines, utilising a telescopic aerial system, which does not interfere with the normal navigation of the vessel. The accuracy with which bearings can be taken when the vessel is awash and even when submerged to depths of 35 ft. is equal to that obtained on board mercantile vessels.

The aerial when in position for operating consists of two non-rotating loops mounted at right angles to each other about a vertical axis, forming a normal Marconi-Bellini-Tosi system. It is raised and lowered by an electrical hoist operated from the receiving cabin, and the time required for raising or lowering does not exceed 20 seconds. The receiving apparatus can be installed in any position up to a distance of 30 ft. from the aerial, and the direction finding receiver can also be used for ordinary receiving purposes within its wave-range of 300-4,000 metres.

At the upper end of the telescopic tube are four longitudinal slots, into which, when the tube is lowered, fold four arms, each hinged at the lower end and linked to a central rod moving in such a way that, after the outer casing has been cleared during elevation, the four arms open, at the same time spreading and tensioning the loop aerials. Each loop is roughly diamond shaped when extended and consists of the necessary flexible conductors protected by tough rubber sheathing. In lowering the aerial, the flexible loops fold and withdraw into the longitudinal slots so that the entire erection can be telescoped into the outer casing. The elevating mechanism consists of two thread rods extending up into the outer casing on each side of the inner tube, running in bearings at the top and bottom and rotated together by a system of gearing connected to a reversible electric motor. The inner tube is carried by bridge members with projections engaging with the thread rods, so that the tube is raised or lowered in a simple manner by rotating the latter.

The new Marconi direction-finder aerial for submarines

Checking Production. By E. Graham Ross, A.M.I.E.E.

A job for the works electrical engineer

IN factory production matters the electrical power side of most executive discussions is brought in at the tail end. Purely electrical concerns are less guilty of the practice than their mechanical counterparts, but the habit exists among them also. The works electrical engineer is presented with *un fait accompli* and told to get on with it. Rarely is he called upon to express an opinion regarding any particular manufacturing process, projected, old, or altered, on the tacit assumption that he is not directly interested in the final results. A definite line of cleavage cuts him off from production finance and the production board from electrical matters.

Mr. E. G. Ross

The board's outlook can be summed up as: "A few more kilowatts on top of what we've got won't hurt." Most works electrical engineers possess a vague feeling that this idea is erroneous, but rarely feel called upon to produce concrete evidence to disprove it. This is a mistake, as the electrical engineer actually possesses a powerful means of making himself heard among the august body, and that on its own ground—finance.

Thus a high-production auto-lathe runs at a relatively high speed, and takes a heavy cut. Its maximum h.p. demand is high, while its power fluctuations with time are wide. Its namesake of lower production rate, and non-automatic, will do the same job in a longer time, but takes a lighter cut, has a lower maximum h.p., while its power fluctuations are appreciably less. The capital cost of the auto is high compared with that of the simpler machine, and if, as is usually the case, the depreciation percentages are the same, what may be termed the £ factor is, broadly, much higher for the automatic than for the simple tool. If the depreciation percentage is higher for the automatic the difference is accentuated. The generalisation applies to all types of production machinery, and, therefore, allowing for the action (even, if possible, to calculate in detail) of the law of averages, the following broad proportionality may be written: Maximum demand of machine$\propto$£.....(1) where £ represents capital cost multiplied by depreciation value; whence m.d.$=X$£.....(2) where X represents the equivalent of the usual mathematical constant. This last must equally symbolise the position with reference to the entire driven machinery in any works taken as a whole.

Full Usage of Automatic Machines

Again, because of this disparity in the £ factor the hourly cost factor of the auto machine is greater than that of the simple tool. Consequently it becomes imperative to maintain the high-production machine in operation as continuously as possible. The same stoppage on the plain machine is of appreciably less importance as regards cost than the other. So that, equally broadly, the high-production tool carries with it a natural incidence of kWh considerably greater in value than does the simple machine. Whence, on the same wide basis as before, kWh$\propto$£.....(3) where £ is as previously, giving kWh$=Y$£.....(4) where Y is another equivalent of the mathematical constant.

The £ factor may be cancelled out from (2) and (4)—

$$\frac{\text{kWh}}{\text{kW}}=\frac{Y}{X}\ldots\ldots \quad (5).$$

Although X and Y cannot be arbitrarily fixed, they do, as symbols, convey to the mind that a given scheme of production modifies the capital value of the plant involved which in some way bears a direct relationship to the quantity of production concerned; *i.e.*, the symbols represent factors of usage of money. The importance of having in operation some means of indicating their incidence is obvious; the works electrical engineer possesses that means while the production board does not.

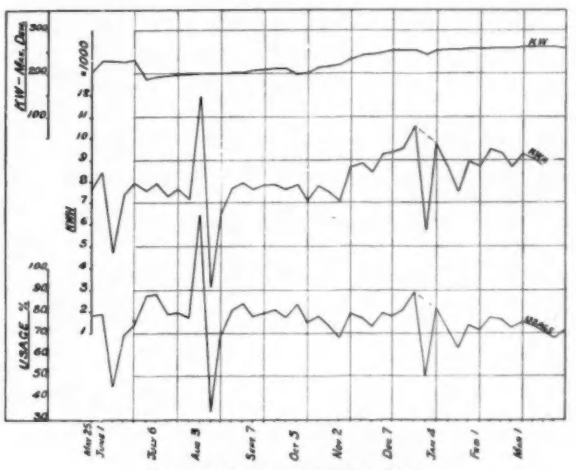
Expression (5) reveals the means, since $\frac{\text{kWh}}{\text{kW}}=\text{Hr.}$, whence $\frac{Y}{X}=\text{Hr.}$ also. The resultant time, however, does not in itself bear any fixed relationship to the normal working week; for example, overtime worked while the m.d. is unusually low would give a result which would eclipse the usual forty-seven-hour week to the limit of possibility, and vice versa. Nevertheless, if the quotient be given as a percentage of the normal working week its regular incidence can be conveyed in a form sufficiently practical to provide a powerful basis of argument. Since every works possesses both m.d. and kWh meters for power, it requires but little labour, first, to record both readings weekly (or daily, if appropriate) on a chart as curves, and, secondly, to add to these a third curve giving the quotient of the first two, expressed as a percentage of the forty-seven-hour week.

The value of doing this soon becomes manifest; the ideal is quickly seen to be that the third curve should always tend upwards to a steady mean value somewhere in the region of 100 per cent. That is to say, the third curve becomes a measure of the "coefficient of utilisation of plant," and therefore of the amount of capital expended towards immediate production processes. This is now, of course, load factor in the inverse aspect. For whereas in the ordinary way load factor forms a basis of charging a consumer with the kWh dispensed, here the kWh form a major part of the indication of reduced costs and improved processing.

The keeping of the third curve places within reach of the works electrical engineer the reasonable possibility of directing his position into one of definite control, in so far as proposals made by others are concerned. The fluctuations in the curve will enable him to prepare unbiased reports for the consideration of his directorate; for it will be found that wide variations of the curve can invariably be traced back to cause and effect within the production organisation and plant.

A Graphic Record

The curves reproduced herewith were used to check the results of decisions taken to electrify a number of old machine tools in a moderate-sized establishment. All the belt drives concerned were scrapped, and individual d.c. variable-speed motors were coupled up to each cone shaft, some *via* gearing, others directly. The kWh and maximum demand indications were plotted weekly, and that section of the resulting chart



The utilisation of works plant

covering May, 1933, to March, 1934, is given herewith. The lower curve gives the corresponding variations of the percentage value.

Prior to August 10th, the fluctuations in all three curves were fairly violent, but after that date the curves became more steady. This date refers to the conversion, which, by virtue of the diversity factor of the several motors, as compared with the previous small number of large units, resulted immediately in a much steadier m.d. Contrary to anticipations, the m.d. was not reduced, but showed signs of early, if steady, increase, while the percentage curve showed a mean falling off. At the end of the period shown it had become quite clear that the usage of the capital value of the plant was no better than before the conversion took place, even although the works was dealing with more output, as indicated by the increased m.d. and kWh. The reason was that the increased speeds (and heavier cutting) imposed upon the old machines replaced the earlier belt losses by greater friction losses, as the plant was not designed for the new conditions.

The conclusion is that mere speeding up of existing plant is

in itself insufficient. If the production scheme had been altered, so as to give each machine one definite job, this would have created entirely new conditions, and the percentage curve would have given a different indication. This was actually proved on October 5th, when two old hand-operated drilling machines were replaced by one new auto-electric radial. Observe the rise in the percentage curve at this date and the drop in the m.d. indications. This was, however, more than balanced on the following week by more plant conversions.

This confirms that the point when modernising is useless is reached much more quickly than is usually realised.

The fallacy of rushing production prior to holiday periods is, again, evident. Note the violent rise in the two lower curves prior to the holiday periods. A sudden amount of overtime is imposed, extra plant is forced into use for a brief time, and an apparently real increase in usage coefficient obtains. The drop in the two following weeks, however, more than counterbalances this, due to lack of stock left to keep the plant running at even the rate prior to the rush dates, while the net financial position is very much worse. Not only has overtime been paid to quite a heavy figure, but any surplus kW demanded must be paid for to the end of the quarter. Here again, the electrical engineer is the only man on the spot able to place these facts in true perspective; for it must be agreed that at these times most production staffs care about little else than output as such, leaving the cost of getting it to others to work out when it is too late to attempt rectification.

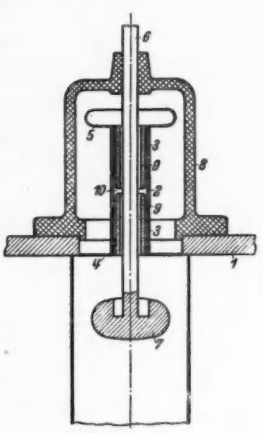
The dips in the two lower curves at January 18th illustrate the effect of the breakdown of a fairly important motor. The percentage curve drops immediately because of the loss of kWh, but the m.d. curve remains nearly constant because the value of the broken-down machine as a means of improving the general diversity factor was lost for the time. Here the percentage curve becomes a potent goad to get on with the repairs, if no spare machine is handy. Incidentally, one or two such declivities will soon indicate exactly for what points of the production plant spare motors must be available.

The chain-dotted lines to the right convey the effect of ignoring consumption during the holiday spell. Holidays forming legitimate gaps in production time, it is unfair to include them in the reckoning. Individual discretion can fix a proper local basis. The main point is that the works electrical engineer can, if he so wills, use his position to form a definite check on the activities of his production board.

Metalclad Rectifiers without Vacuum Pumps

HITHERTO, vacuum pumps have been regarded as essential auxiliaries in all installations of metalclad mercury-arc rectifiers and, in the latest installations, provision is generally made for starting the pump automatically directly the vacuum falls to a predetermined value. According to an article by Dr.-Ing. W. Dällenbach, in *Elektrotechnische Zeitschrift*, the cause of the deterioration of vacuum lies in the diffusion of atomic or ionic hydrogen from the cooling water through the iron walls of the rectifier vessel. By using a cooling liquid which contains no hydrogen ions, and by adopting a construction which eliminates packed joints, the need for vacuum pumps can be eliminated, thus simplifying and cheapening the equipment and substantially extending the field in which metalclad rectifiers can compete with glass-bulb rectifiers and hot cathode valves.

Experience indicates that there is no difficulty in ensuring the vacuum-tightness of welded joints themselves. An integrating test for leakage consists in evacuating the vessel and then filling it, under pressure, with a chemically active gas, any leakage being detected, in the course of some hours, by the discoloration of an indicating cloth or paper with which the vessel is covered. The tightness of the vessel is not alone sufficient; it must be heated to 572-752 deg. F. for degasification prior to sealing off, and the new leading-in construction illustrated permits such heating by eliminating the usual types of packings. In this drawing, *1* represents the cover of the vacuum vessel; *2*, a glass tube fused to the nickel-iron or chromium-iron tubes *3*, which make vacuum-tight joints with the cover *1* and conductor *6* by means of thin membranes *4*, *5*, respectively. The conductor *6* carries the anode *7*, and is itself supported by the insulator *8*.



The leading-in method described

This lead-in construction is unaffected by heating to 752 deg. F., and the welded joints of the container can be hammered, chipped or ground without fear of damaging the electrode seal. The cathode lead-in is built on the same principle. The cylindrical screens *9* concentrate the potential gradient existing inside the glass insulator on the relatively narrow gap *10*, at a distance from the fused joints between *2* and *3*, thus avoiding the formation of glow discharge at these joints.

Gas Emission and Diffusion

On evacuating and heating a mild steel container made by the method described, large quantities of steam are first given off. This emission ceases at about 752 deg. F., but hydrogen is expelled from the interior of the metal for a considerable time. Thereafter, carbon monoxide and carbon dioxide are given off almost indefinitely as long as the heating is maintained, these gases being formed by the reduction of oxides by the carbon in the metal.

On cooling, the vessel will maintain a vacuum higher than 10^{-4} mm. of mercury indefinitely. If, however, it be used as the vacuum chamber of a water-cooled mercury rectifier, *i.e.*, at temperatures below 212 deg. F., gas is again given off. Its presence is not noticeable as long as the arc is burning, but as soon as the arc is switched off, a quantity of gas is released which is greater the longer the period of operation since the last pumping. Micro-analysis, by means of a modification of Langmuir and de Ryder's apparatus, shows that the gas thus evolved consists of pure hydrogen.

Confirmation that this gas actually diffuses through the walls of the vacuum chamber from the cooling water, has been obtained by tests with tubes subjected to preliminary degasification at 752 deg. F. and then immersed in distilled water at various temperatures between 0 and 212 deg. F. In a certain case, a seamless steel tube of 5 mm. wall thickness held a vacuum of 10^{-4} mm. mercury as long as the tube was in air, but within 8 min. of immersing 53 sq. in. of the surface of the tube in distilled water at 203 deg. F., a hot-wire vacuum-meter revealed the presence of hydrogen inside the tube and the rate of diffusion increased rapidly at first, reaching a steady value after about 17 hours.

From these investigations it follows that water-cooled, iron-tank rectifiers cannot be used without a vacuum pump because there is a continual diffusion of hydrogen from the water into the rectifier chamber, increasing in amount with the temperature of the water and with the hydrogen ion content of the latter. This diffusion of hydrogen is not evident on the vacuum gauge as long as the arc is burning, because the molecular hydrogen is ionised by the arc and driven into the walls and electrodes. The hydrogen saturation of these parts may, however, become so high that the emission during the idle periods of the anodes results in backfire. This, says Dr. Dällenbach, affords an explanation of the fact that backfires occur with relatively greater frequency where rectifiers are in continual operation (as in electrochemical works) than in ordinary traction service, where nightly or similar periodic shut-down allows sufficient time for the hydrogen to be evacuated.

Eliminating the Pump

Tests have been made with iron vessels, previously evacuated at 752 deg. F. and charged with considerable quantities of oxygen, water vapour, nitrogen, carbon monoxide and carbon dioxide, to imitate the possible conditions after years of service without a vacuum pump. In every case these gases disappeared soon after striking the arc and gave no trouble. In other words, a rectifier chamber of this type and preparation is immune from deterioration of vacuum by all the gases occurring in practice excepting hydrogen, and, if hydrogen be excluded by using a cooling liquid free from hydrogen ions, the vacuum will improve or "harden" in service.

This conclusion has been confirmed by the behaviour of a pumpless six-phase rectifier for a full-load current of 640 A. Cooling is effected by the boiling of a liquid, free from hydrogen ions but of otherwise unstated composition, a fan-cooled condenser taking the place of the usual cooling water connections. No vacuum pump is provided but the mercury-vapour pressure round the anodes is kept at the most favourable value, regardless of load, by dividing the cooling system into two parts. The primary cooler removes most of the loss-energy, while the lightly-loaded secondary cooler condenses mercury which might otherwise establish too high a pressure round the anodes. The vacuum in this rectifier has actually increased during six months' service.

An Underground Rectifier Sub-station

An unusual installation in the "Metesco" system

THE advantages of placing rectifier sub-stations supplying low voltage d.c. networks at the centres of the load cannot often be enjoyed because of the difficulty or heavy expense of obtaining suitable sites at the right points. Such obstacles have been overcome by the Metropolitan Electric Supply Co., Ltd., at Stanway Gardens, Acton, London, where the whole of the equipment, comprising a 500-kW Hewittic rectifier bank with its transformer and switchgear, has been practically sealed into an underground chamber below the roadway.

The chamber had a rectangular opening at the top, through which the equipment was installed, after which it was covered by a concrete slab and the roadway rebuilt over it. The only access to the sub-station is through the two ventilator shafts. These are brought up through the footpath, where they are surmounted by small louvred pillars provided with doors, through which a man can enter for routine inspection of the equipment.

By adopting this arrangement the supply company has been able to place the sub-station in such a position with relation to the network it supplies that the need for heavy untapped d.c. feeders, involving considerable expense in copper and copper losses, has been eliminated, the network being fed by four distributors radiating direct from the sub-station.

Large Glass Bulbs

The Hewittic rectifier is said to be one of the first large grid controlled glass bulb installations in Great Britain. It comprises four single bulb units supplied from a 6,600-V 50-cycle system through a 3/12-phase transformer and has an output of 500 kW d.c. at 480 V. It is arranged for remote control from an attended rotary convertor sub-station at Southfield Road, some two miles distant, or, alternatively, for local operation.

The a.c. side of the rectifier plant is fed through a circuit-breaker, adjacent to the transformer. This unit is motor-operated to meet the requirements of remote control. The remaining bank of switchgear, comprising three circuit breakers, controls the connections to the h.v. busbars of the three feeders forming part of the company's system.

Beyond the transformer are two of the rectifier cubicles, and on the opposite side of the chamber are the d.c. control panel, grid control cubicle, and the other two rectifier cubicles.

The grid controller is at the bottom right-hand corner of the d.c. control panel. It is driven by a small motor through suitable reduction gearing, and works in conjunction with the equipment housed in the grid control cubicle, to apply a bias to the rectifier grids at the correct point in each cycle of anode voltage. By this means the d.c. voltage may be varied from full down to zero, and the regulation is carried out over this complete range smoothly; that is, in an infinite number of steps.

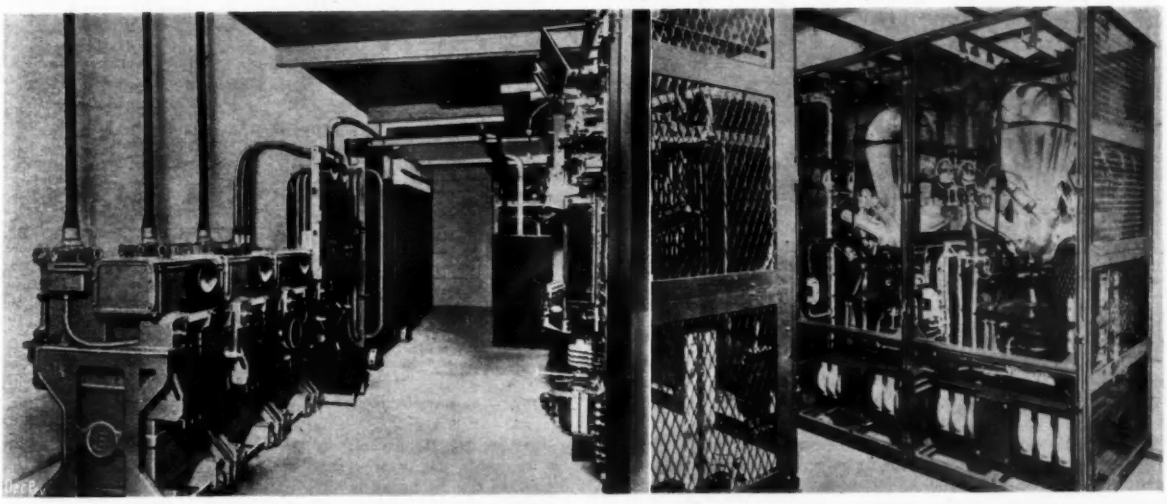
Thus the plant may be switched on to a dead network after, say, a supply shut-down on the high-voltage side and will, because of this gradual voltage control from zero, take up the load on the network gradually, no matter what the conditions. Also, should conditions arise in the network or in plant in parallel to throw abnormal overload on to the rectifier plant, the grid regulator will lower so as to maintain the full capacity current rating at the necessary lower d.c. pressure.

On the e.h.v. supply side switching is carried out by the oil circuit-breaker, which is fitted with overload protection and is arranged for electrical operation by local or remote control. No breakers are required on the d.c. output side of the plant; instead, the automatic load control relay on the d.c. control panel prevents the d.c. voltage from being raised further, once a predetermined overload is reached, and also causes a reduction of voltage if the load continues to increase.

The simplicity of the remote operating arrangements is worthy of special note. Only two push buttons are installed at the remote control plant (Southfield Road), these being labelled "Raise volts" and "Lower volts."

Should the pressure on the network be low, the "Raise volts" push button is pressed. If the sub-station is not in service, then this will have the effect of closing the oil circuit-breaker at Stanway Gardens and of subsequently putting the grid controller into operation, thus raising the voltage (so long as the button is kept depressed) until the station is taking the required load. Subsequently, *i.e.*, should the sub-station already be in service, the operation of the push-button will simply have the effect of raising the voltage further and taking more load as required.

Should it be desired to lower the d.c. voltage at the feeding point, as indicated by the remote control meters, then the "Lower volts" button is pressed, which causes the grid controller to lower the voltage (also so long as the button is kept pressed), and finally when zero voltage is reached the oil circuit breaker will trip, shutting down the sub-station.



Left: H.p. switchgear, transformer, rectifier cubicles, and l.p. control gear. Right: Hewittic rectifiers (front screens removed)

These two control buttons, together with the indicating instruments on the remote control point, provide full remote control of the plant. Local control buttons also are provided at the Stanway Gardens sub-station.

Supervisory Indicators

As has already been pointed out, two push-buttons at the remote control panel carry out all the control operations; and at this panel also indications are registered of current output from the sub-station, the d.c. voltage on each side of the mid-wire and the oil switch position, and indication is given as to whether the full complement of rectifier bulbs at the sub-station is in service or otherwise.

The operating supply is obtained from the d.c. network, or, alternatively, from the battery at the Southfield Road station, so that if necessary the Stanway Gardens equipment can be started on a dead network.

The efficiency of the installation is high at *all* loads, actual figures obtained being 93 per cent. at 5/4 load, 93.5 at 4/4, 93.3 at 3/4, 93 at 2/4 and 92.3 at 1/4 load. This fact, coupled with the saving in copper losses (resulting from the central placing of the sub-station) and the low maintenance charges on the plant, ensures most economical working.

The installation was carried out by the Hewittic Electric Co., Ltd., to the specification of the Metropolitan Electric Supply Co., Ltd. The e.h.v. switchgear and the d.c. switchboard were supplied by sub-contractors, Switchgear & Cowans, Ltd., and Messrs. Bertram Thomas respectively.

Control of the Grid System

IN the area covered by the South-East and East England Schemes of the Central Electricity Board there are more than fifty generating stations containing some 2,000,000 kW of plant, over 1,000 route miles of h.v. overhead lines and cables, and thirty-two 132-kV, sixteen 66-kV, and thirty-six 33-kV lower-voltage transforming stations. The output of these stations to the grid this year is expected to exceed 4,000 million kWh, about one-third of the total generated by public supply undertakings in Great Britain.

This system is supervised from a control room and auxiliary offices at Bankside, S.E. The main functions of the control

At the E.A.W. Ball. **(See page 593)**
Mr. and Mrs. E. A. Mills (Hackney) and Sir Arnold and Miss Enid Gridley

organisation are to direct the operation of generating stations, to issue instructions regarding switching, to supervise the permit-to-work card system, and to keep records. At present, the operation of switches and tap-changing mechanism is carried out at the generating stations and grid points. For its communication channels the Board rents lines reserved by the Post Office for its exclusive use.

Recent developments in the equipment for the automatic transmission of signals over telephone lines have enabled the following operations to be carried out with the use of only one channel between the control room and each important grid point, sometimes with supplementary channels radiating from the main grid points to give telephone facilities only to secondary grid points:—(1) Communication with all important points on the system; (2) immediate automatic indication regarding the 132- and 66-kV and other switches and the positions of taps on important transformers; (3) automatic indications, as required, of load transfer in kW and reactive kVA through main transformers, voltages at points on the 132-kV system, kW and reactive kVA on certain feeders, and kW sent out from important generating stations; (4) transmission of a limited number of routine instructions to important generating stations by a seven-point visual telegraph. The automatic panels are built into one side of the control room wall, access to the mechanism being obtained from a gangway at their rear.

Synchronised rotary drum switches connect the indicators with the initiating devices at remote stations. Switch positions are shown by illuminated semaphores, and tap positions and instrument readings by circular-scale instruments. Dials for the time control of frequency are mounted on the wall above the panels. The control deck is equipped with a miniature diagram of the whole system; on this the positions of all circuit-breakers, isolators and earthing switches are set by hand. On the wall at the rear of the control deck is a large edition of the miniature diagram, from which it is electrically operated.

Illumination, whether natural or artificial, is provided by a large double laylight. Panel heating is employed in conjunction with thermostatically controlled low-voltage immersion-type storage tanks. A separate storage cylinder is installed for the general supply of hot water.

A short-circuit calculating table in one of the offices is set up as a miniature reproduction of the system, the impedances of the lines and transformers being represented by fixed resistances and those of the generators by variable resistances. The possible fault kVA, and the contribution to the total passing through any given switch, can be rapidly obtained for various switching arrangements and combinations of generators, thus enabling a close estimate to be made of the effect of sectioning, with a view to preventing fault kVA from exceeding the rating of the switchgear. For the solution of problems outside the scope of this table a universal type of short-circuit calculator is installed. An illustration of the Bankside control room appears on page 587.

Prepayment Consumers and Domestic Appliances

THE prepayment meter has been an essential factor in load development among weekly wage earners, but in its single-rate form it has not lent itself to encouraging the use of electricity for other purposes than lighting. Two-part tariff prepayment meters have been introduced to enable the smallest consumers to use the larger electrical appliances economically.

Figures obtained by the Metropolitan-Vickers Electrical Co., Ltd., from a number of households show the beneficial effect of installing "Load-rate" meters. In this meter a magnetic switch alters the gear ratio so that a coin inserted is spent more slowly when an appliance is used of greater capacity than the lighting demand. There is only one kWh dial, but a fixed relationship exists between the money collected and the total kWh supplied, which determines the number of kWh charged for at each rate. Taking into account the loading of a number of appliances a suitable point at which to change from the primary to secondary rate, is considered to be between 350 and 400 W.

Data from 100 average consumers, who formerly used 77 kWh each per annum to produce a revenue of £1 18s. 6d., show that after the introduction of the double-tariff meter the annual consumption became 74 kWh at 6d. and 57 kWh at 1½d., giving an average revenue of £2 4s. 2d. The installed capacity averaged 244 W for lighting and 1,080 W for other supplies. The increase in consumption was thus 70 per cent. and in revenue 15 per cent.

Average annual consumptions for this class of consumer are given as: stage 1, lighting only, 80 kWh; stage 2, lighting and small appliances, 200 kWh; stage 3, lighting, small appliances and cooker, 900 kWh.

The cost of installing four lights and a 5-A socket is £4 5s.; adding £1 10s. as a contribution towards the cost of meter and service cable, gives a total of £5 15s., to be redeemed over a period of years. With lighting only (80 kWh), allowing an addition of 2d. to cover the fixed charges, the outlay will be redeemed in fifteen years at 8 per cent. If the load-rate meters are so calibrated that only the primary consumption is subject to the additional 2d., but 25 per cent. of the whole of the revenue is regarded as applicable to redemption, the assisted wiring scheme becomes a paying proposition at an earlier stage without handicapping the extended use of appliances. In stage 2, 80 kWh at 8d. and 120 kWh at 1½d. produce an annual revenue of £3 8s. 4d., 25 per cent. of which is available for interest and redemption, *i.e.*, 17s. 1d., which enables the installation to be written off in ten years with interest at 8 per cent.

In one scheme for introducing appliances, voucher cards are sent out at intervals to prepayment consumers, entitling them to obtain specified apparatus free of first payment, and showing the number of monthly payments of, say, 1s. each, required to complete the transaction. These payments are collected when the meters are cleared.

In most cases, as soon as the purchase of one appliance has been completed advantage is taken of the next voucher to begin the purchase of another appliance. During a recent campaign conducted for a month by a large undertaking, appliances were being sold on these terms at the rate of one every two minutes of the working day.

The Fouling of Insulators

A PAMPHLET entitled "Factors which Contribute Towards Insulator Reliability" has been produced by Messrs. Taylor, Tunnicliffe & Co., in which it is pointed out that the effective resistance of an insulator cannot be determined from the creepage distance only. The total resistance, when the insulator is evenly coated with deposit, is equal to the surface resistance coefficient multiplied by the resistance of a square section of the deposit. The limitations to the use of the equation are that the insulator is rarely completely coated with deposits of uniform thickness. The parts of an insulator which contribute most to the s.c.r. value are almost invariably those which are most susceptible to deposit, such as the portion round the pin of a cap and pin insulator; it is easy to increase both the s.c.r. and creepage distance without correspondingly improving reliability. Curves are given indicating the s.c.r. values of the company's 10-in. cap and pin insulators, which are designed to meet the conditions.

The E.A.W. Conference

THE ninth annual conference of the Electrical Association for Women opened on April 19th, with a general meeting (which was its first as an incorporated body) at the Hotel Great Central, N.W. The report, presented by the director (Miss C. Haslett), summarised the activities during 1933 and referred to the forthcoming publication of a consensus of women's views on the design and supply of domestic apparatus. Notable developments during the year have been the formation of demonstrators' and teachers' circles in London, Manchester, Liverpool and Birmingham, and the starting of a correspondence course, which was indirectly responsible for the recent publication of the "Electrical Handbook for Women." Six new branches have been created at local centres. Margaret Lady Moir, Mrs. G. Z de Ferranti, and the Dowager Lady Swaythling agreed to continue to act as president, chairman, and hon. treasurer for the coming year.

The president's membership cup was presented to Mrs. M. M. Hutchinson (Farnworth) for the second year in succession, her record being eighty-five new members, and the E.A.W. diploma in electrical housecraft for teachers was handed to some of the twenty-eight successful candidates.

A resolution, moved by Councillor Mrs. Gregory (who gave particulars of activities in West Ham), and seconded by the Lady Mayoress of Bradford, Mrs. A. W. Brown, "that the time has now come when electricity should be available at an economic rate in the homes of the working people," started an informative discussion.

Lady Moir presided at the subsequent luncheon, at which Sir Wm. Crawford proposed the toast of "Women's Contribution towards Electrical Progress." He expressed the view that, except with regard to lighting, the public were not yet electrically minded, and unless all members of the industry itself were 100 per cent. electrically minded they would not convert 45 million people. Nothing could be achieved without training, and it was especially necessary to educate children, as the E.A.W. was doing. He thought that the industry could not let the E.A.W. have too much money for its work.

Success of the Diploma Scheme

Miss Haslett, who was received with musical honours, referred in her response to the debt owed by her Association to such men of vision as Ferranti and Sir Hugo Hirst, who realised that its strongest point was that it had no commercial axe to grind and was free to evolve its own policy. The Board of Education had shown that it was alive to the importance of providing children with a knowledge of electricity which would be essential in after life. There was at present a shortage of well-trained demonstrators, but it was expected to rectify this within the next twelve months. In two years 198 diplomas had been earned, and in the September examination 75 per cent. of the entrants passed. There were 177 candidates for the next examination for the electrical housecraft certificate.

"Electricity for the Working Woman" was proposed by Miss Ellen Wilkinson (vice-president), who complained that some undertakings appeared to regard electricity as much too good for the "working classes," but it was far more of a blessing to them than it was to people who had servants. With proper national planning electricity should be supplied without metering, as water was now. Those who sold electricity should also provide the appliances, and great strides had been made recently in including the charge for the latter in the rent.

Sir William Ray (chairman, E.D.A.) responded. He suggested that the toast should have been "Electricity for All," as until it was used by all sections of the community prices for one class of consumers could not be greatly reduced. The undertakings were dealing with costs satisfactorily and were adjusting tariffs to the consumers' capacity to pay. In Liverpool there were 256 all-electric municipal houses, rented at 16s. per week, in each of which were installed nine lights, a cooker, a water-heater, a wash-boiler, two electric fires, and a heated linen cupboard. A charge of 1s. 3d. per week was made for the apparatus and 0.5d. per kWh for electricity supplied through prepayment meters. The weekly cost averaged 6s. and the annual consumption 5,577 kWh. With more general use the rate would be reduced by one-half or two-thirds. Heavy consumption was the basis of low prices. The support given by undertakings and manufacturers of appliances to the Association showed a realisation of the importance of its work. Lady Moir briefly thanked the speakers.

Decoration by Light

Advantage was taken of a reception at headquarters (20, Regent Street, W.) in the evening to display new ideas in lighting, which formed the visual basis of an address by Mr. W. J. Jones (manager, E.L.M.A. Lighting Service Bureau), who showed the practicability of covering walls with light instead of wall-paper, buying light by the yard, and floodlighting gardens. Cable for these displays was provided by the Cable Makers' Association, temporary wiring by Messrs. Troughton & Young, Ltd., and general assistance in the supply of electricity by the St. James' and Pall Mall Electric Light Co., Ltd. A musical programme was arranged by Mrs. E. E. Leete, and old Japanese prints of lighting methods were lent by the Dowager Lady Swaythling.

Friday morning was taken up with visits to the Building Centre and the E.L.M.A. Lighting Service Bureau. In the afternoon a party of about 200 visited Battersea station of the London Power Co., the first women's organisation to do so, Sir Francis Floodgate (chairman, L.P. Co.) said. After the tour of the station, Dr. S. L. Pearce (chief engineer) gave a lecture, illustrated by lantern slides, on "The Elimination of Sulphur Oxides from Chimney Gases." After pointing out that domestic chimneys contributed by far the major proportion of atmospheric pollution, he said that his company was dealing with its effluent in four ways: the use of Scotch and Welsh washed coals with a sulphur content of only 0.8 per cent.; the installation of cyclone grit extractors; the wet treatment of the residual gases; and the erection of 340-ft. chimneys.

The ball held at the Wharncliffe Rooms in the evening was, as always, most enjoyable. Special attractions were arranged by Miss Rosemary Northcroft, including a cabaret and a lucky draw. Some secured white "Pekes"; others—more fortunate, as we think—obtained useful electrical appliances, of which we trust they will prove worthy.

Seen at the E.A.W. Conference

From left to right: Mr. R. P. Sloan, Mr. C. D. Taite, Mrs. G. Z. de Ferranti, Miss Crompton and Col. R. E. B. Crompton, and Sir William Ray, M.P.

Electricity Showroom Management. By S. F. Osborne

The claims of technical training and salesmanship

THE growth of the domestic load depends upon a well-organised sales service and an efficiently managed showroom. The load is built largely upon the advice given through the medium of the showroom staff, sales representatives and canvassers, who form the link between the management and the customer. Upon these, the consumer depends for all advice, whether technical or otherwise, and, in my opinion, if the correct advice is to be given, these representatives should consist of technically trained, rather than "high-pressure," salesmen. If this were realised by the responsible members of the industry the load would soon expand on the "goodwill" of a few satisfied, well-advised consumers, rather than retarded due to dissatisfaction among consumers resulting from their being wrongly advised by cook demonstrators and assistants in their attempt to hide their lack of technical knowledge. It is deplorable that these people, particularly those first mentioned, who are not expected to have technical qualifications, should be allowed, or expected, to deal with inquiries which are beyond their capacity.

[Jerome, Ltd.

Mr. S. F. Osborne

The degree of technical knowledge required by a showroom manager is often very much under-estimated, and unless there is a technical man always to hand, to whom the consumers may be referred in the case of a technical inquiry, his qualifications should be at least up to the standard required for the graduateship of the I.E.E., the Final City and Guilds, or the Higher National Certificate in electrical engineering. Naturally, practically all inquiries are received in the showroom, and in a large number of cases cook demonstrators and non-technical assistants are left to advise consumers or contractors on such things as wiring regulations, motor installations and pipe-work or water-heating installations. If there is no competent man available the inquirer is either incorrectly advised or he has to "write in" for his information, both of which lead to dissatisfaction. It has been questioned whether showroom managers with a good knowledge of showroom routine, window dressing and domestic apparatus can be expected to have the required standard of technical qualifications. If they have not, then they should have always available the backing of a good technical man who can deal with inquiries which are beyond the capacity of the showroom staff. Such representatives would come under the title of commercial manager and could take charge of all hire schemes, assisted wiring installations, and all wiring for apparatus hired by the department.

Many undertakings have found it an advantage to bring showroom management and hire schemes directly under the control of a commercial manager, for, in so doing, lower paid assistants can be engaged for showroom work, such as window dressing and sale of apparatus.

Qualifications for Commercial Manager

There does not appear to be a recognised examination covering the required qualifications for such commercial managers. Though the Institution of Electrical Engineers has introduced into its final examination a section on engineering organisation, management and economics, this by no means covers the requirements for the management of the commercial side of the supply undertaking; it only enables one to become a "Chartered Electrical Engineer" with still less technical knowledge than has previously been required. While the new I.E.E. Syllabus includes many factors useful to anyone following a course for company management in a manufacturing concern, the omission of such items as a thorough knowledge of the Electricity Supply Acts and the powers of local government detracts from its value to members of a supply undertaking.

Recording Hired Apparatus

The main advantage of bringing hire schemes under the control of the showroom or commercial manager is that the loss of time in passing information through the various departments is eliminated. Immediate delivery of apparatus hired or purchased adds to the satisfaction of the consumer, and since it is essential that apparatus hired should be delivered to the consumer's address and not taken from the showroom by the consumer, all apparatus should be dispatched direct from the showroom as soon as possible after the hire form has been completed and the hire charge paid.

The system of recording the apparatus hired varies greatly between municipal undertakings and private companies. In some undertakings the cost of recording the hire of small apparatus very often exceeds the amount charged for hire, due to too many people, and in some cases highly paid ones, dealing with a job which could well be carried out by a low-paid assistant. The number of different systems of recording hire schemes in this country are almost as many as the number of undertakings who use them, and though the records have to be made particularly clear for the benefit of external auditors in the case of a municipal undertaking, there does not appear to be need for the marked difference that exists in the expenses incurred in this direction between municipal and private undertakings.

Cooking Demonstrations

Regular cooking demonstrations are more favoured by municipal undertakings than by companies, and it has been found that these only warrant the expense incurred in a very few cases. In rural areas, some of the largest undertakings in this country hold that for villages and small towns with a population of anything under 8,000, not more two to eight demonstrations per year, depending upon the number of consumers, is all that is required. For the same expenditure as that incurred in more frequent demonstrations much better results can be obtained from canvassing. Compared with this, some of the large municipal undertakings hold cooking demonstrations five days per week, at a cost of anything between £300 and £500 per annum.

An improvement in the results from cooking demonstrations can be obtained by asking the consumers who visit the demonstration to sign their names and addresses in a visitors' book, and arranging to follow up the consumer at a later date if a cooker is not hired within a week or two of the date of the visit. A few words at the consumer's house will very often bring results from the interest created at the demonstration. The formation of a card index of the names and addresses of consumers who have attended demonstrations and not hired cookers is well worth a few of the many hours of spare time usually at the disposal of the cook demonstrators. The cards can be filed under street order and removed when a cooker is hired.

Actually, the consumers could be requested to sign, or give their name for entry, direct on the card in order to save the second entry from the book to the card. This system not only forms a good "follow up" record but also enables the staff to keep a check on visitors from outside their area of supply. The punched card system can well be applied to the card index outlined above, and by this method the consumers due for "following up" can be sorted out very easily while the cards are filed under street order instead of having to be filed according to date order as would otherwise be necessary.

Window Dressing

The standard of window dressing in most of the suburban electricity showrooms is often very far below that of other trades in the same area, and though very good results can be obtained from a well-dressed window this form of advertising is usually left to the efforts of an inexperienced assistant. A window could be set out as a complete kitchen with cooker and refrigerator and a display of small kitchen apparatus, or as a bathroom containing a water heater over a bath and a small hand basin, electric towel rail, and illuminated mirror. Both are more effective than a row of water heaters or cookers lined up along the front of the window which is inanimate and not very attractive.

Cooker Repairs

The need for urgent attention to cooker breakdown calls should be treated with the same importance as "No light" calls, and in all cases except where the undertaking is of such a size that it warrants a cooker maintenance department, these calls should be dealt with direct from the showroom. By questioning the consumer, a competent assistant can often determine the nature of the trouble, and therefore send the necessary new parts by the engineer who is sent to carry out the repairs, thus eliminating the necessity of a second journey to the job.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Electricity in Gasworks

In the paper by Mr. F. M. Birks which was read at the Institution of Mechanical Engineers in London on April 20th, tabulated figures of the power, both steam and electric, used by modern gas-making plant show that the cost, which is influenced by the quantity of waste-heat steam available, of generating electricity in twelve works of the Gas Light and Coke Co., not including capital charges, averages 0.25d. per kWh.

The author favours the direct use of steam for driving all plant which must be safeguarded against stoppage, even of short duration, but most modern gas works nevertheless employ a large proportion of electric power. Owing to the availability of cheap steam from waste heat and breeze fuel, electricity can, the author maintains, usually be generated at works more cheaply than it can be purchased. This method enables the steam-driven units to be of a size and type which result in high efficiencies. In addition, the system conserves boiler feed water, as the generating plant is almost invariably fitted with surface condensers.

In many cases, waste-heat boilers are not favourably placed with regard to the steam-using plant, as they require to be installed as near as possible to the source of heat. Even so, allowing for both motor and electric transmission losses, a figure of about 18 to 20 lb. of steam per b.h.p.-hour can be obtained at the unit plant, which shows a considerable economy over small individual steam units. Most modern works use three-phase a.c. at voltages up to 440, although much higher voltages are used for transmission purposes.

Switchgear Improvement

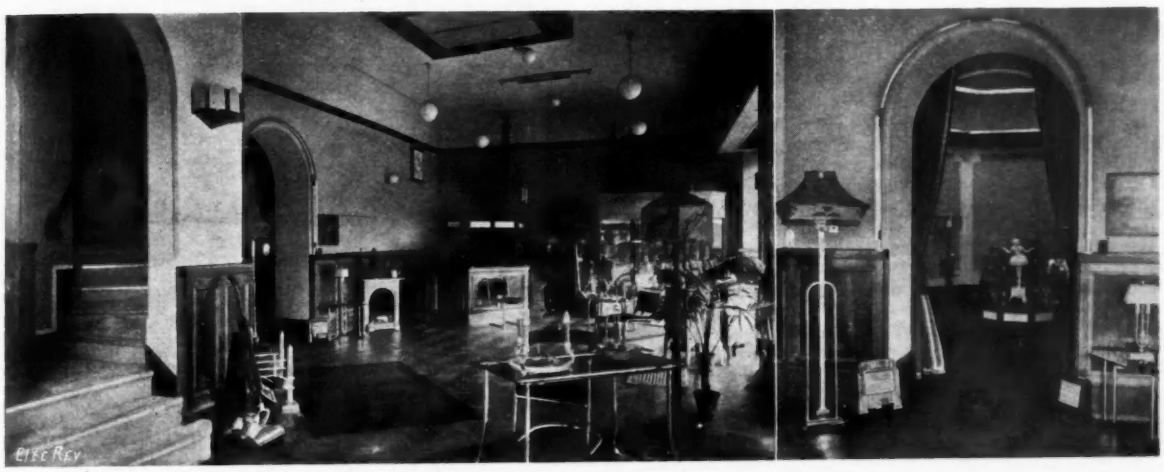
The gas industry has been to a great extent instrumental in improving the design of motors and switchgear for its particular purposes. The high electrical conductivity of coke dust makes it of vital importance that the gear shall be absolutely dust-tight, and owing to the insistence of gas engineers on this requirement, motors and switchgear are now available which can be relied upon to function perfectly under the very worst conditions. In many situations in gas works electrical equipment is subjected to corrosive influences, so that the minimum thickness of casing now accepted for switchgear is $\frac{3}{16}$ inch.

The growth of conveying and grading plants, often with complicated sequences of operation, has developed the use of contactor gear. This enables the sequences to be varied and also provides a safeguard against accidental or inadvertent stoppages of part of a plant only, which would result in delays due to choking with the conveyed material. Such contactor gear, when required to control fifteen to twenty motors, is housed in dust-tight buildings; this enables switchgear of the open type to be used with all connections exposed to view, so that it is readily accessible for alteration or repair. The building is not entered except by electricians, as operators control the plant operations by means of push buttons situated in the most convenient positions.

The company's Brentford works have recently been almost entirely rebuilt. The generating plant consists of three 350-kW, 3-phase, 50-cycle, 440-V steam turbo-alternators and one 50-kW motor-generator for providing 220-V d.c.

The main cables are arranged in a ring around the works with sub-switch rooms at convenient points. Isolating switches are so installed that any section of the main cables can be isolated for repair without affecting the works supply as a whole.

Electrical precipitation of tar is a recent development which is practised, particularly in America, to a large extent. The Gas Light and Coke Co. has installed plants of this type at two of its works. The gas is passed upwards through tubes, in each of which is suspended a lead-covered electrode hung from an insulator and energised with d.c. at about 40 kV. The electrical discharge results in the tar being precipitated on the inside of the tubes in drops which flow downwards and are discharged at the base of the treatment chambers. The high-voltage d.c. is obtained by transforming and rectifying a.c. of low voltage and limited amperage.



The main showroom of the Warrington Electricity Department and the entrance to one of the rooms. **(See page 603)**

Aluminium Conductor Vibration

Fracture of the strands of steel-cored aluminium overhead-line conductors is definitely due to vibrational fatigue, says Mr. J. L. Eve in a paper which was read before the Overhead Lines Association in London on April 18th.

The author explains how swirling eddies are formed behind a wire of circular cross section when suspended in a plane at right angles to the direction of flow of air currents. These eddies exert an alternating force on the wire, causing it to vibrate in loop lengths of from 10 to 25 ft., with an amplitude in extreme cases of 2.5 in. and a frequency of from 6 to 30 cycles per second.

The author is not aware of any conductor which has broken entirely in this way, but most of the fatigue failures in this country during the last two years have occurred on a particular size of steel-cored aluminium conductor, namely, 0.15 sq. in. copper equivalent made up of 37/0.102. Both layers of aluminium strands have fractured, the outer slightly more than the inner layer in the author's experience. It has been observed that vibration is most prevalent when the wind has a velocity of approximately five miles per hour, and where the transmission line runs across country uninterrupted by hills or other obstructions. These fractures have occurred mostly at suspension points, *i.e.*, just at the entrance to the suspension clamp, and in some instances just at the entrance of the tension clamps at points on the strands where they had been crossed by those of the adjacent layer. On lines that are apparently identical in conductor make-up and general conditions there have been failures in some places and not in others. The author thinks it will only take place when there is vibration at a time when the tension in the individual aluminium strands is above a certain amount.

There are methods of calculation which are supposed to give the proportion of tension that is taken by the steel strands and the aluminium strands, but the author does not think that it is possible to apply these methods to stranded composite conductors made up of two metals so vastly different in their

modulus of elasticity and their co-efficient of expansion. When the temperature falls below that at the time of erection the aluminium strands will contract at practically twice the rate of the steel. This will have the effect of considerably increasing the proportion of stress taken by the aluminium.

The author advocates the advisability of over-stressing the conductor before finally sagging the line. This will have the effect of artificially stretching the aluminium wires and consequently ensuring that at lower temperatures the proportion of tension that they are supposed to take will not be too severely encroached upon. A conductor made up with a long lay ratio might possibly be loosely or unevenly stranded, and in this condition it is possible that some of the aluminium strands may be taking more than their share of the stress. A clamp of a bad design will accelerate fatigue failure, but it will not take place with an inferior clamp if the tension is below a certain ratio. At the same time it will take place with any design of clamp if the tension is above a certain ratio.

What precaution must be taken is a question of economics. Is it cheaper to have a low tension and big sag, using more steelwork, or have a high tension with a consequent saving of steelwork and take care of fatigue by using dampers?

Discussion

Major T. Rich, president, said that vibration was causing a very great deal of concern. A German firm constructed a special wind tunnel and found that the best conductor shape was a triangular section. He believed that with the aid of dampers the difficulty could be very largely eliminated.

Mr. W. Fennell said that on a particularly long span with which he was concerned the aluminium portion of the conductor was not used for support in any way. The aluminium was not taken into the grips at all, the steel doing all the work of carrying the line.

Mr. Jocelyn Swan referred to a "copper weld" line in his area which caused noise at the terminal pole for perhaps five minutes at a time and then ceased.

Mr. C. F. Mounsdon said he was not convinced of the advisability of the author's recommendation to over stress wires before sagging.

Mr. H. W. Grimmitt pointed out that vibration had been experienced largely in countries that did not adopt ice loading, and to avoid it there must not be too much tension. In future the criterion might not be ice or wind loading, but vibration.

Mr. J. W. Preston said at the moment there did not appear to be any really satisfactory solution of the problem. Conductors made of materials so widely differing in characteristics as steel and aluminium were not really sound mechanical jobs. About over stressing, he also had very grave doubts.

Mr. C. H. E. Ridpath also supported the reduction of the tension at which a conductor was erected. The design of clamps also definitely had a great effect. There had been no fatigue failures of any steel cored aluminium conductors employing the cone type clamp. The Stockbridge damper had definitely solved vibration trouble.

Mr. E. A. Boyd remarked that the author had rather confused failures due to over stressing and vibration. If dampers were to be used then the clamps need not be worried about except from the point of view of crushing the conductor. His own preference was not for the Stockbridge damper; a piece of the stranded wire itself clamped as in the case of the Bates damper made a much more satisfactory job.

Mr. R. C. Anderson said experience he had had with a line in Ohio showed that 80 per cent. of the breakages were at the suspension clamps. Mr. Varney told him when he was in America that the best way to deal with vibration failures was to put up a conductor with a factor of safety of about 3.

Mr. W. D. Tuck said vibration failure was due to a combination of many different things happening at the same time, and it was difficult to sort them out and discover the chief culprit.

Mr. G. W. Molle said an engineer who had erected a large number of overhead lines in America told him that over stressing should on no account be done because it would pull the steel work to pieces.

The author, in reply, said that the Research Association was carrying out lay experiments. Putting all the stress on the steel and not on the aluminium, as mentioned by Mr. Fennell, was uneconomic. An inferior clamp would increase the trouble; at the same time, he did not believe that the best clamp would stop vibration if there were a high tension on the line. Only when there was practically no wind did serious vibration occur. The Stockbridge damper had the merit that it could be put up after the line had been erected and, if necessary, while the line was "alive"; 5,000 were being installed at the present time. In some cases lines had been vibrating for seven years without any trouble.

The "Velox" Supercharged Boiler

ONE of the claims made for the "Velox" steam generator is that an exceptionally high overall efficiency is obtainable. The name refers to the high velocity of the flue gases employed to obtain unusually high heat transmission.

Combustion takes place under pressure far in excess of that generally employed. This pressure is partially transformed into velocity in order to obtain the high flue-gas speed, which may reach the velocity of sound. An evaporator of novel design with forced circulation is combined with a gas-driven turbo-blower, operated by the products of combustion, which delivers air to the combustion chamber at the high pressure required for supercharging.

In a paper by Mr. Adolph Meyer, of the Brown Boveri Co., which was read before the INSTITUTE OF FUEL in London on April 25th it is explained how the gas turbine is disposed between two heat-absorbing parts of the boiler in order to reduce the temperature of the flue gases so that the turbine does not need to be cooled, and also to permit sufficient heat to remain in the gases to provide the energy for driving the turbo-blower.

The heat which remains is passed on through the feed-water heater to the boiler following the gas turbine. A special device, which has no moving parts, is used to separate the steam from the water. Into it the mixture is injected tangentially on to the cylindrical wall of the container at such a velocity that it rotates with sufficient force to cause separation by centrifugal action.

The very small amount of steel and water taking part in the heat transmission, together with the entire absence of fire bricks and the small storage of water which is necessary, enables the boiler to be started quickly and to be very flexible in operation under variations of load. Control is entirely automatic and the efficiency high over large variations of load. The weight and space occupied by the plant are small, since supercharging reduces the size of the combustion chamber in addition to the reduced size of the heat transmission portion resulting from the use of high flue-gas pressure and speed.

Actual Operating Results

A paper by Mr. M. G. S. Swallow, which was read recently at the North Western branch of the INSTITUTION OF MECHANICAL ENGINEERS at Manchester, deals with the serviceability, reliability, and mechanical soundness of the plant already in actual industrial service, and with the test results and operating experience obtained therewith.

The first "Velox" steam generator put into regular service was oil fired and installed in a Spanish sugar mill to deliver 31,000 kg. of steam per hour at a pressure of 19 kg. per cm² and a temperature of 350 deg. C. The second is in a French iron works and fired with blast-furnace gas, producing 13,500 kg. per hour at 33 kg. per cm² and 425 deg. C. The third is also oil fired, producing 25,000 kg. per hour at 21 kg. per cm² and 375 deg. C., and is installed in a French power station to act as peak-load and spare plant for a hydro-electric system.

Besides two units used by the Brown Boveri Co., it and its concessionary companies are building two marine installations, and others for Switzerland, a French machinery manufactory, the University of Madrid, and a hospital at Aarau.

High-voltage Cable Improvements

THE trend in high-voltage cable technique is reviewed in the paper by Dr. P. Dunsheath which was read before the Manchester Technical Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION on April 19th. The author records that greater care in selecting paper and impregnating oils and process improvements have lifted the insulating resistance of 33-kV cables normally obtained from about 500 megohms per 1,000 yards to a figure which can amount to well over four times this value.

A warning is given about the care needed in using the time-voltage curve for predicting long-time dielectric strength. This graph does not represent a continuous function, and power factor and ionisation considerations provide reasons for anticipating the occurrence of a definite weakness when a certain voltage is reached.

The author has for some time past advocated an alternative test. From knowledge of the cable he would estimate the long-time, say 50-hour, value and samples five times the normal length would be subjected to this value of voltage until they failed. If they failed in less than fifty hours a new length would be tested at a slightly lower voltage. If the sample lasted more than, say, 100 hours, then the voltage for the next piece would be increased accordingly.

The power factor of cables has been improved strikingly of

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Contractors and Supply Authorities

The letter from "A Sufferer" prompts the question: On what principle or by what title can electrical contractors claim a collective monopoly of installation work?

The supply authorities' stations and mains and the consumers' installations are complementary parts of the supply systems, each is useless without the others; how can it be argued that installation work is not a legitimate part of the supply authorities' business? or that anyone setting up an installation contracting business acquires thereby a moral title to a monopoly as against the supply undertaking in the same area?

This outfit is used on his farm by Mr. D. Black, of Bacton, Suffolk. The 2-h.p. Newton motor which drives the concrete mixer supplants a petrol engine. A supply is tapped off overhead lines which are installed around the farm

As a matter of relevant history, in the earliest days of the supply industry, there was no one competent to make consumers' installations excepting the undertakers' staffs. I know, because I was there in the beginning from 1882. I have nothing against the contractors—their activities have been, and are, beneficial to the industry. In some respects they have advantages appreciated by many consumers; in some respects the advantages are with the supply people. Competition is good for all parties, especially the consumers, for whose service both exist.

I have no personal interests on either side of the controversy, and friends on both sides; I think it unfortunate that there should be animosity, where there is really a community of interests.

HENRY M. SAYERS.

Streatham, S.W.16, *April 21st.*

More Flex Wanted

I was interested to read Mr. Onslow's letter in your issue of April 20th, on the above subject, as I have held and expressed similar views for some time.

In an article on "The Design of Electric Fires" in the ELECTRICAL REVIEW of August 28th, 1931, I stressed the lack of uniformity on the part of manufacturers with regard to the length and size of flexibles supplied, and suggested that it would be better to supply fires without flexibles. Most fires and electrical appliances are bought for stock, and the conditions under which they are to be used are not known until they are sold, and this is the time for the retailer to fit the correct length and size, using two- or three-core flex according to the nature of the installation. It may be argued that this means additional work for the retailer, but I think it would be found in the end that this would be more than offset by the time and expense involved in disconnecting wrong lengths and types of flexibles and fitting new ones. There would be no waste of material, and the consumer would be saved a good deal of inconvenience in many cases.

Another somewhat similar ground for criticism is the common practice of sending out small electrical appliances fitted with bayonet cap adaptors. It is my experience that at least 90 per cent. of such adaptors have to be disconnected and plugs fitted. Here, again, it seems that the obvious thing to do is to send out appliances without adaptors and plugs, and leave the retailer to supply the fitting necessary for use on the installation where the appliance is being used.

These are relatively small matters, but in our business of providing satisfactory and efficient service to consumers it is the details that count.

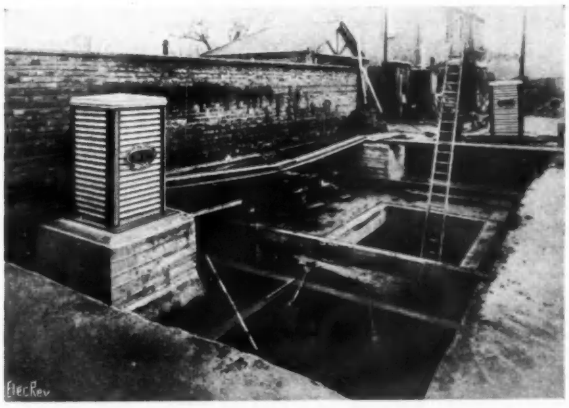
W. K. FLEMING,
Burgh Electrical Engineer.

Rothesay, *April 21st.*

Incentives to Salesmanship

It is far from my intention to be destructively critical of Mr. Plucknett's suggestions in his article on the above subject in your issue of April 13th, but the statements advanced and the justifications pleaded in support undoubtedly call for comment.

The "quota-points" system is a long-established method of providing a basis of appraisement for the remuneration of salesmen and has operated with considerable usefulness, more particularly in the marketing of consumable goods for which there is a recurrent demand. The system has, in fact, proved particularly appropriate for such classes of merchandise from the purely "selling" point of view but has operated as a not unmixed blessing to those individuals whose activities have been subject to it, for it is obvious that such a system, far from constituting an "incentive," can, and has been, operated merely as a many-thonged economic whip to further the ends of commercial avarice.



The hole through which the plant was lowered; also the ventilating pillars at the Metesco sub-station described on p. 591

Electrical appliances or "electrical service" are definitely lasting in character, and such inconsiderate use of the system would militate against sound commercial or beneficial electrical development in the interests of the common good. Let

High-voltage Cable Improvements (*continued from opposite page*)

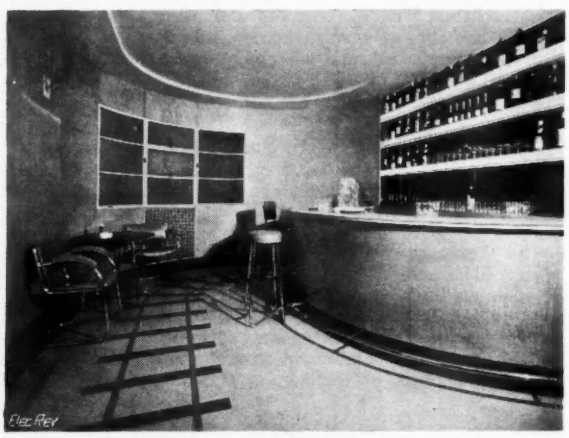
late, but it is not yet possible to determine whether this factor varies appreciably from point to point along the length of a cable. Ionisation may not be distributed uniformly; it may be caused by a vacuous section only a few feet in length and will disappear when the cable is cut up and atmospheric pressure is admitted. This phenomenon is more likely to occur in a three-core than in a single-core cable, owing to the greater facility for pressure adjustment longitudinally along the worming spaces. There is scope for invention in the designing of stability tests. The author considers that a 14-day test should suffice, regarding a year's test as an expensive luxury. A reasonable maximum temperature would be 65 deg. C. with 10 per cent. over working voltage.

As there are real physical difficulties in the way of ensuring permanent and complete impregnation under all service conditions, recent suggestions have included the application of fluid pressure to the dielectric. In order to combine the established advantage of this with the provision of expansion and contraction facilities, and at the same time retain the simplicity of the normal type of cable, the author has recently developed the gas cushion cable. It is armoured, laid direct in the ground, and has simple joints and terminals without exceptional accessories. The insulation is normal, but there is an electrically screened space between it and the lead sheath which is filled with inert gas under pressure. The separate cushions are formed by a spiral spacer in permanent intimate contact with the lead sheath combined with an arrangement for forming a compound seal in each turn of the spiral channel. Test figures quoted in the paper show complete stability.

us consider in detail your contributor's recommendations and how they would influence the furtherance of electrical development as a force essentially for public welfare.

I feel sure that the consensus of opinion among commercial and development engineers would be that "high-pressure salesmanship" in the raw has no useful place in our endeavours, and, in fact, it has been my experience during nearly ten years' development work in supply undertakings having from 20,000 to 150,000 consumers in populations of from 90,000 up to over a million that "high-pressure" selling can be a positive danger to worthwhile development. The true art of selling is definitely not the "overcoming of great sales resistance" (the kick in such cases coming soon or late from the purchaser) but rather in the intelligent creation and cultivation of the desire to possess.

In this lies the future of sound electrical development for we have the appliances, apparatus and services which peculiarly lend themselves to such methods which automatically build up goodwill and general satisfaction such as is impossible under high-pressure methods so unnecessary with a first-class com-



The new American bar at Euston Hotel; the shelves are illuminated by Maple tubular fittings, and there is a system of floodlighting for the walls

modity and so easily breeding scepticism and mistrust. Commercial development sections of electricity undertakings should be directly responsible to the management, and should be subject to the minimum of subservience to other sections which up to the present have naturally been considered senior.

The "monetary incentive" is very rare in electricity undertakings. It is a well-founded axiom that a man's remuneration should be commensurate with the general effect of his activities on the undertaking as a whole—a point which has been consistently ignored in the case of sales and development staffs. This does not mean quite so literally commensurate as your contributor recommends, but something in the nature of payment on ultimate results such as units sold per head of population, load factor of the station, revenue received against the expenditure involved in providing the supply and hiring services, &c.

If the remuneration of canvassers or salesmen is dependent on personal or individual competition, figures of turnover come uppermost and the consumer suffers by reason of being the victim of the pressure exerted regardless of his interests. (The development of cooking suffered considerably by early consumers being "over-cookered," giving rise to a widespread belief that electricity was very expensive.)

I do not think that the point system lends itself to our aims as the sound progress of electrical development cannot be made the medium of a scramble which will react unfavourably in the long run. Experience prompts me to suggest that if development staffs be rewarded on a "points-credit" system, then there should be a contra account of "points-debit" to operate in respect of consumers' complaints and eventual disconnections, as a necessary condition of the scheme.

Development assistants should have had at least three years' experience in practical installation, distribution and showroom work so that they may appreciate their responsibilities before sallying forth to the mission field.

To keen young men like your contributor these observations may seem pessimistic, but the only justification offered is the fact that if a thing is worth doing (as electrical development assuredly is) it should be done worthily and well and so ensure the future being built on a firm foundation rather than on what stunt salesmanship can only make a quicksand.

G. Hedley Davis, *Sales and Installations Engineer*,
Corporation Electricity and Tramways Department.
Newport, Mon., *April 23rd*.

I read in the Electrical Review for April 13th a very good article by Mr. Plucknett on this subject.

I agree with the writer's views, but I should like to point out that salesmanship can be carried on without salesmen.

During a fortnight's tour of South and South-West England, I was surprised at the number of supply authorities who do not rely on salesmen for their sales. I consider that where salesmanship is not encouraged, the salesmen should turn their thoughts to window dressing. I have found that by attractive, and if possible mechanical, window displays many sales are effected.

In my opinion an old Turkish proverb can effectively be used in electrical salesmanship, *i.e.*, "Kiss the child to win the heart of the nurse." Attractive, brightly coloured booklets, which give advice concerning electricity, should be distributed to children coming into the showrooms. The parents will in most cases read this literature. Even by putting these booklets in the baby's perambulator we shall ensure that the nurse or parent will certainly read them before destroying them. John Wilkins.

London, *April 20th*, 1934.

The Curse of Cut Prices

Most gentlemen on the road selling lighting plant and lighting fittings, and most manufacturers of these things, know the folly and ruination of cut prices, particularly marked during the past three years or so. Not a few of the recent insolvencies have been attributed to this tremendous mistake. And this much is true, even if it is not new, that there is a saturation point below which low prices are a source of evil both to the buyer and seller.

But I must confess to the fact that I did not realise, until I began to ask more pertinent questions, how great it is at both ends of the trade, and how much it affects the price of wiring, as well as the supply of fittings. Perhaps some cutting in the fittings section is due to direct selling. And if it is, even that is pretty poor consolation for the legitimate wholesaler, for before very long he looks like being called on to supply only credit sales items which cannot be obtained from the foreign manufacturer's agent. Before long, too, the fittings wholesaler and stockist will be gone out of business. And that is not to the best interests of the trade. Maybe I speak feelingly. A lot of us who have suffered do.

Turning to the other side. There is not the same reason for price-cutting in installation work. Fortunately for the trade the foreigner has not bunged our market full of foreign wiremen. And fortunately, also, most power supply companies demand a certain standard of work, which means that a job is reasonably well done with British material and British labour.

Why, then, if we take the case of ten contractors estimating for ten certain jobs, should they unfairly cut any one of them and then complain, as sometimes they do, that the living has gone out of the electrical trade. It most certainly has if only one half of what I hear is only half true. But why cut? Each of those ten jobs referred to has got to be done. And the individual contractor believing in himself and his job, will find the same law of averages at work which I, as a salesman, am advised to follow—the more good calls I put in each day the more chance I have of getting a good selling book at the end of the month.

And for the contractor and his contracts this also is true, particularly if he can make himself known for the quality of his work. On the law of averages he is bound to get his share of the work going. F. T. J. Firminger.

London, N.5, *April 20th*.

Flue-dust Precipitation

We would like to call your attention to what we think is an incomplete statement of facts regarding the two Sturtevant electrostatic precipitators which were mentioned in the article appearing in your issue of April 13th describing the Brimsdown "B" power station.

The article stated that our precipitators operate at an efficiency of 91 per cent. at normal boiler rating, and we feel that this statement should be amplified to a certain extent, due to the well-known fact that electrostatic precipitators can and do give efficiencies up to and over 99 per cent. Our own plants at Brimsdown were designed to give an efficiency of 87 per cent. at normal boiler rating and 85 per cent. at peak load, and as the official tests showed an efficiency of 91 per cent., it will be seen that our guaranteed figure has been exceeded by from 4 to 6 per cent. Although many of our precipitators operate at above 99 per cent., it is obvious that such highly efficient plants would not be installed when efficiencies of 85 to 90 per cent. are sufficient to fulfil the purposes for which they are used. Sturtevant Engineering Co., Ltd.,
Geo. A. Mower, *Managing Director*.

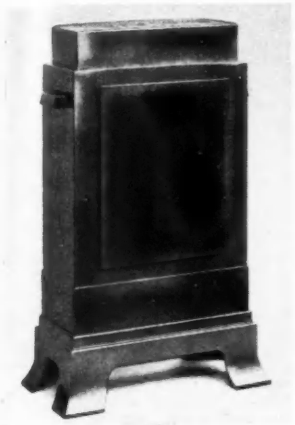
London, E.C.4, *April 20th*.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Convector Heaters

A portable low-temperature heater introduced by MESSRS. BRATT, COLBRAN & Co., 10, Mortimer St., W.1, measures 15½ in. wide by 24¼ in. high by 8 in. deep and is controlled by a single switch.



One of the new Bratt, Colbran convector heaters described in these notes

It is made in two types—the 1,000-W, which is sold at £5 15s. in sprayed bronze finish and £6 in lustral colours, and the 2,000-W, at £6 12s. 6d. and £6 17s. 6d. for similar finishes. A pilot light can be supplied at 4s. 6d. extra. Modern or period designs are available, finished in pastel colours in both cases for various types of room.

Low-priced Cooking Utensils

MESSRS. GIRLINGS, LTD., Electricity Works, Maldon, Essex, specialise in the manufacture of low-priced cooking utensils.

The latest additions to their now comprehensive range are a saucepan and a porringer. The former is made of heavy gauge aluminium. It is claimed that if switched on with the saucepan dry, unless the bottom is melted, the element remains undamaged. The prices are 12s. 6d., 17s. 6d., and 25s., with maximum loadings of 800, 1,000 and 2,000 and diameters of 6, 7 and 8 in. respectively.

The porringer is made in two sizes, holding 2 and 3 pints, priced at 25s. and 30s., and loaded at 800 and 2,000 W (max.) respectively. In all cases a three-heat switch is fitted.

Ferranti Radio

To afford the trade an early opportunity of viewing their new season's models, MESSRS. FERRANTI, LTD., Hollinwood, Lancs, exhibited a range of a.c. radio receivers in London last week. The "Lancastria" at 12 guineas is a four-valve, including rectifier, set in a walnut cabinet with inlays of quilted maple and dark mahogany; the superhet. circuit gives 2.5 W output. In a somewhat similar cabinet, the "Arcadia" is priced at 15 guineas and has five valves. The six-valve "Gloria," listed at 22 guineas, has a full walnut cabinet distinguished by the incorporation of an electric clock mounted in chromium. A feature of the two last named sets is the good reproduction which is claimed to result from the "high note uplift" developed by the company. The 30 guineas "Arcadiagram" combines a five-valve receiver with a motor-driven gramophone turntable and pick-up built into the top of a walnut cabinet.

The Ferranti 6-valve "Gloria" receiver

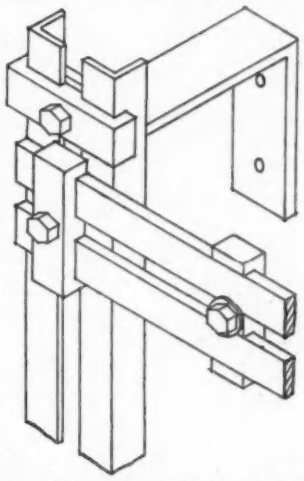
All these sets have "electric" tuning and a large horizontal scale in a rectangular chromium frame. On the scale are station names, based on the Lucerne plan, and their wavelengths. Each operation is indicated: pointers show the wave band, medium or long; the station being received, its wavelength, the degree of volume; the shade of tone, mellow or brilliant, and whether the set is "on" or "off." This is the most comprehensive and conveniently operated dial we have seen.

An Aluminium Alloy

In addition to their sections, sheets and matting of pure aluminium, BRITISH INSULATED CABLES, LTD., Prescot, Lancs, are now supplying similar shapes in an aluminium-silicon alloy. This alloy is lighter, stronger and harder than pure aluminium and possesses a medium-high tensile strength together with a fair degree of ductility. It may be worked and handled in the same way as pure aluminium. The approximate tensile strength, depending to some extent on shape, thickness, &c., is 8½ to 10 tons per sq. in. for soft temper and 12 to 14 tons per sq. in. for hard temper.

Iron Switch Panels

For reducing the amount of cutting, drilling and fitting angle iron frames intended for supporting ironclad switchgear, the PANEL FITTINGS Co., 19, Sackville Street, W.1, has introduced the "Gearfix" system, which is designed to enable the erection to be carried out with the use of a spanner only. The accompanying figure shows the method of building up the panel. The prices, per ft., of the upright members are for light sections 8d., and for the heavy (over 100 A) 1s. 2d.; cross members are 6d. and 8d. respectively, and the cost of other items is in relation to these.



A "Gearfix" structure for light gear

Preventing Belt-slip

A special bandage is now on the market which is claimed by the CONTRASIT CO. OF GREAT BRITAIN, 109, Kingsway, W.C.2, to stop slipping of belts, to decrease power costs, to increase the life of the belts by running them more slackly, to keep them free from grease and compounds and to increase production of the machines driven. The "Contrasit" bandage is fixed to the pulleys, and its installation need not hold up production.

A New "Full o' Power" Battery

SIEMENS ELECTRIC LAMPS & SUPPLIES, LTD., 38, Upper Thames Street, London, E.C.4, has recently placed on the market a new "Full o' Power" battery for use with the K.B.274 "Kobra" radio set. This battery (size No. 11937) is 120 V h.t. and 9 V grid bias combined, the dimensions being 7½ in. by 8¼ in. by 3 in. It is listed at 12s. The company has reduced the price of its battery for Marconiphone set No. 255.

Automatic Radio Gramophones

The new "Model 288" auto-radio-gramophone announced by the MARCONIPHONE CO., LTD., 210, Tottenham Court Road, W.1, employs the "Lucerne" chassis introduced in "Models 286 and 262" in February last, with the addition of eight-record automatic playing mechanism, which repeats or rejects at will and switches off at the end of the last record. The "Type 19" pick-up has a vertical needle-changing position, while a self-starting mercury switch is incorporated. The a.c. all-mains five-valve reactive superheterodyne circuit has a constant-peak bandpass input preceding a screen-grid combined detector-oscillator, followed by a transformer-coupled variable-mu intermediate-frequency amplifier and power grid second detector, whose output goes by a triple compensated auto-transformer coupling to an indirectly heated power pentode; the fifth valve is a heavy-duty rectifier. The energised moving-coil speaker is fitted with hum-neutralisers and inclined for optimum sound distribution.

The new Marconiphone radio-gramophone

The equipment is priced at 27 guineas, while other new season's receivers are the 15 guinea battery "Model 273," a transportable 16 guinea "Model 279," and a 15 guinea mains "Model 296."

The 27 guinea "Superhet. Five Forty-Two Auto-radiogram" announced by the GRAMOPHONE CO., LTD., 363, Oxford Street, W.1, has new record-changing mechanism which enables the instrument to play eight records and switch off at the end of the last one, play eight records and repeat the last one

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indefinitely, or repeat a single record as many times as desired.

"H.M.V." receivers are to be fitted with a device which indicates when the set is correctly tuned.

G.E.C. Radio Developments

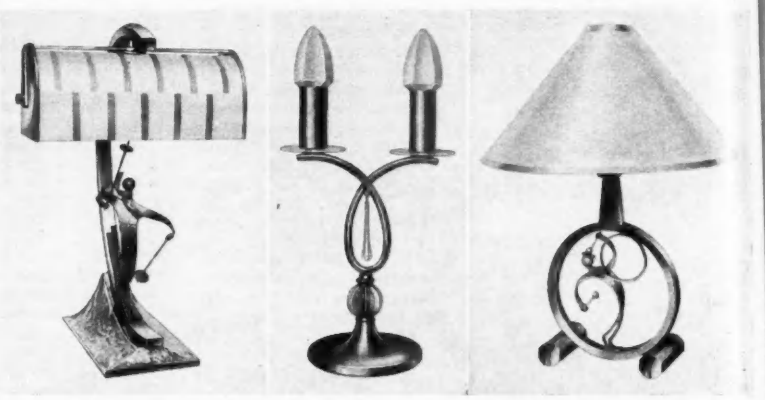
The "Overseas 7" short and medium wave superheterodyne receiver for a.c. mains is a new product of the GENERAL ELECTRIC CO., LTD. It is intended primarily for the overseas market and its salient features include simplicity of operation, one knob tuning and no coil changing; full delayed automatic volume control, mains-energised moving-coil loud-speaker, and it is entirely self-contained in a bakelite cabinet.

The wavelengths covered by it are 12-550 metres, range selection being obtained by a switch having five waveband positions. Seven "Osram" valves (including one for rectifying) are employed, and the power consumption is 80 W. The price is £24.

Hitherto only radio receivers connected to a.c. mains have employed automatic volume control, which is so often beneficial in compensating for signal fading.

The appearance of the Type HD.21 "Osram" double diode triode valve will, however, now offer equal facilities to users of battery-operated sets. This new valve consists of two entirely separate electrode systems within the one bulb, somewhat similar to the principle adopted in Class "B" valves. The filament system is divided into two halves within the bulb; one half encloses the two small diodes necessary for detection and a.v.c., and the other filament encloses the triode system necessary for amplification. This method of construction enables the diode system to be enclosed within an earthed screen which provides very effective electrostatic shielding within the valve. In addition, the whole of the filament of the second system is available to provide the necessary electron emission for the triode. The filament takes 0.2 A at 2 V and the triode characteristics are amplification factor 27, impedance 18,000 ohms, mutual conductance 1.5 mA per V.

The valve is supplied in a seven-pin base with metallised or clear bulb, and the control grid is taken to a small metal cap on the top of the bulb, which takes the place of the screw terminal and is a convenience in making a quick and firm connection by means of a metal clip. The price is 9s



Three table standards which have recently been introduced by the General Electric Co., Ltd. Model F.10225 (left) is 12 in. high, has amber coloured glass and costs £3 10s.; F.10202 (£2 2s.) is 10¾ in. high to sconce pans; and F.10212 costs 32s. 6d. without shade. All models are chromium plated

All-angle Lighting Fittings

The lighting fittings described under this heading in our issue of April 13th are called "Anglepoise," not "Equipoise" fittings, as stated.

The "Servis" Electric Cooker

THE "Servis" cooker is a new production of Messrs. Falk, Stadelmann & Co., Ltd., 83-93, Farringdon Road, E.C.1. It embodies no revolutionary features, but its design incorporates some excellent modern principles. The oven is provided with side and bottom plug-in elements of the pan-cake type, which embody steatite tubes carrying the resistors housed in pressed steel cases. The non-hygroscopic insulation eliminates electrolysis. Each element is provided with four pins, one of which provides a positive earth connection.

A "stripped" view of the new "Servis" cooker and a detail illustration showing the arrangement of the hotplate and grid

The three elements are identical but a new system of wiring ensures that whichever element may be at the oven bottom dissipates only two-thirds of its loading. Medium heat is only one quarter of full heat and "low" is one-sixth; the user is therefore provided with an extra low heat instead of the usually redundant "medium."

An adjustable hinged door is fitted in the main oven door to prevent steaming, and it is claimed that it cannot gum up with grease.

The under-hob construction is on simple lines to facilitate cleaning, and a catch eliminates the need for screws to hold the hob down. The operation of a push button which is exposed when the hot-cupboard door is opened allows the hob to be raised, when a simple automatic strut keeps it open. Access to the fuses is obtained by this means.

The large hot-cupboard is free from obstructions; its sides, back and floor are in one piece, the floor being carried forward to form a weathered joint with the front casting. The drop door which closes the hot-cupboard is spring loaded to hold it shut and a quadrant is fitted to form a stop in the horizontal position, thus avoiding strain on the enamel of the front or door if the latter is slammed open.

Stiffening webs on the underside of the grill boiler keep the casting free from distortion, and between these the elements are sunk in steatite troughs, the design being such as to avoid the retention of spluttering fat at the point of coil support. The runners for the pan form an integral part of the grill boiler and fat is thereby prevented from entering the hot-cupboard.

As with the oven elements, a four-pin plug contact is fitted to both plates and grill, the fourth pin providing the earth connection. In view of the de-tempering effect of local heat on brass contacts each plug is reinforced with a sherardised steel spring, enabling it to carry 50 A without undue heating.

In order to protect the porcelain switch knobs, the control panel is recessed. The panel is sloped so that visibility is improved and the knobs are more readily handled. Wiring throughout is by "Rockbestos" wire and solid copper bus bars; all connections are secured with lock-nuts and insulation is of steatite. An earth terminal from the exterior of the cooker body is connected to each element through a separate circuit. The cast-iron frame or undercarriage which carries the plates, grill boiler and hob is provided with two integral lugs which project through the back panel. To these the arms of the plate rack are rigidly bolted, thereby relieving from strain the enamelled sheet metal parts of the cooker and leaving the hob free to move upwards. The vertical thermometer is sloped backwards for easy reading, and owing to the even distribution of heat throughout the oven its indications are found to conform with the results obtained.

All screws are rust proof; vulnerable sheet metal parts are vitreous enamelled; and all corners are well rounded. The legs are of the cabriole type.

The "Servis" cooker has been designed by Mr. S. F. Bickell, chief engineer of the company's Cooking and Heating Department, and a factory has been laid out for its manufacture.

Four models are at present available. The miniature type with one 2.5 grill boiler (three persons) and a 1 kW oven, 12 by 11½ by 12 in., finished in grey mottled porcelain, is listed at £5 16s. 6d. Another model for six persons has a 2-kW oven, 13½ by 14 by 13 in., a 2.5-kW grill boiler, and one 2-kW boiling plate, and is priced at £12 10s. with the same finish.

In the Courts

IN the Chancery Division last week Mr. Justice Bennett heard an action brought by Mr. Henry Bloom, managing director of Beeantee Illuminations, Ltd., against Mr. Harry Shulman, of Philpot Street, E., for an injunction to restrain the defendant, his servants and agents from threatening to infringe and from importing, manufacturing, offering for sale, selling, dealing with or using electric lampholders, constructed in infringement of letters patent No. 341265 and generally from infringing the plaintiff's rights therein.

The defendant denied that he had infringed or threatened to infringe the plaintiff's patent. He further said that if the cap and/or lampholder described or shown in specification 389664 came within the claim of the plaintiff's patent (which was denied) the plaintiff's patent was invalid. The defendant also pleaded that the plaintiff's alleged invention was not real and/or was not proper subject-matter for letters patent in view of common general knowledge at the date of the grant and in view of the publication at the Patent Office Library prior to the date of such grant of a French specification No. 362784 of 1906, referred to in a letter of May 1st, 1933; secondly, because the complete specification did not sufficiently or fully describe the nature of the invention or the manner in which the invention was to be performed in that (a) no sufficient directions were given for the construction of the lampholder for use with other than twin cables; (b) no sufficient directions were given for the construction of a lampholder embodying a cap such as was shown in the specification; and (c) that the nature of the invention was not sufficiently defined and that the claim was ambiguous.

Mr. Trevor Watson, K.C., for the plaintiff, having explained the nature of the plaintiff's invention, read the correspondence which had passed between the plaintiff's solicitors and the defendant in 1933 and which he (counsel) submitted showed that the defendant had threatened to sell lampholders and caps which would be an infringement of the plaintiff's patent. If that were so, it did not matter whether the things were used for single, twin or multi-core cables.

Mr. Ewart Andrews, a consulting engineer and patent agent, gave evidence as to examining the plaintiff's specification 341265, the defendant's specification 389664, and the French specification 362784 of 1906. He said that the feature of the plaintiff's invention was the locking of the cable on to the spike so as to prevent any possibility of the wire coming off. Another feature of the invention was the closing of the cap so as to make it watertight. In his opinion there would be no difficulty from the directions given in the plaintiff's specification in applying the invention to a lampholder for use with other than twin cables.

Mr. H. Fletcher Moulton then opened the defendant's case, saying that in his submission the question for decision was purely one of construction for his Lordship. He contended that holders constructed in accordance with the defendant's specification could not be held to be an infringement of the plaintiff's patent rights. He further submitted that plaintiff's patent was invalid for want of subject matter.

At the conclusion of the arguments his Lordship, in giving judgment, said that the defendant having made an application for letters patent, had lodged a complete specification. In April last year the plaintiff's solicitors had written to the defendant to the effect that his patent did not apply to any patentable subject matter and calling upon him to withdraw his application as otherwise they would have to institute proceedings against him. On May 1st, 1933, the defendant wrote a letter to the solicitors, which letter the plaintiff relied on as being a threat by the defendant to infringe plaintiff's patent. He (his Lordship) said he had very little doubt that what the defendant intended to convey by that letter was to make a lampholder with cap substantially as described in the plaintiff's specification, which would be an infringement of the invention. He accordingly granted the injunction as asked by the plaintiff and the defendant would have to pay the costs of the action.

Uxbridge Supply Co. Sued

In the King's Bench Division on April 17th the hearing was commenced before Mr. Justice Finlay of an action by the Steel Barrel Co. (of Uxbridge), Ltd., against the Uxbridge and District Electric Supply Co., Ltd., to recover damages for nuisance or trespass on the land of the plaintiffs.

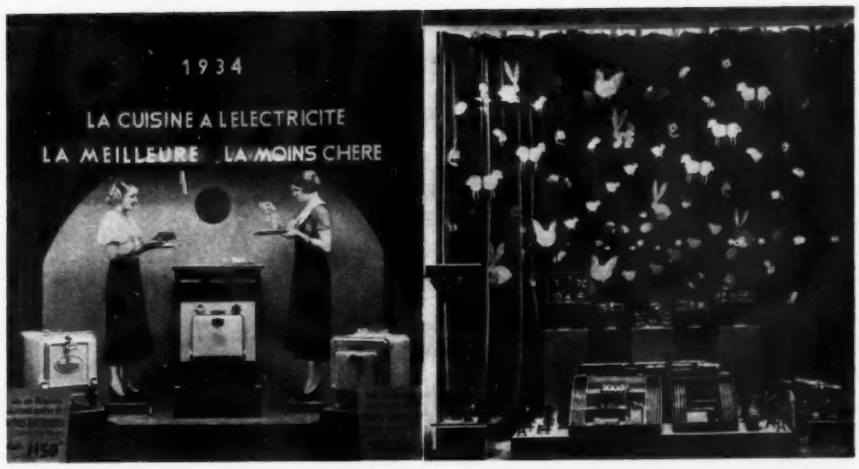
Mr. Croom-Johnson, K.C., for the plaintiffs, said that by arrangement with the previous owners of the land the Supply Company had a h.p. transformer station there which the plaintiffs had asked them to remove. The plaintiffs would say that as the result of the defendants' refusal to remove the plant they became trespassers on plaintiffs' land they further said the plaintiffs had suffered inconvenience in carrying on their business and pecuniary loss. The plaintiffs had now installed their own electricity supply.

When the hearing was continued on April 19th Mr. Hood Barrs gave evidence for the plaintiff company. He said that the real complaint was that while the negotiations were going on for the supply of electricity by the defendants to the plaintiffs the defendants did not cut the cable to the station. The cable was kept alive all the time. It was found that there was a key to the station in the possession of the company, but nothing could be done. When the plaintiffs got into the station the power was not cut off.

Mr. J. G. Scott, an engineer, and director of the plaintiff company, also gave evidence.

At the close of the plaintiffs' case Mr. Roland Oliver, in opening the defendants' case, contended that the plaintiffs in any event could only be entitled to nominal damages, but he submitted that in the circumstances the plaintiffs were not entitled to any damages at all. During the time that the parties were negotiating about the supply of current it was necessary that matters should remain in *statu quo*. It was absurd to suggest that while there was a possibility of the negotiations resulting in an arrangement being come to the defendants should have cut the cable which might have to be joined up again.

Mr. Randall Bell, an engineer in the employ of the defendant company, gave evidence, in the course of which he said that the cable was cut outside in the public street. That was thought advisable for safety and so that no portion of the cable could remain alive on the property of the plaintiff company.



Two effective show-windows of the Office Centrale Electrique, Paris: Left, Cooking apparatus; right, electric toys for children

On September 16th, 1932, defendants' men removed from the plaintiffs' premises the whole of the single-phase installation there.

Mr. Robert J. Hughes, an engineer in the employ of the defendants for twenty-five years, gave evidence that on November 25th he went to the Steel Barrel Co's works for the purpose of making some tests. He noticed then that the door of the transformer house was open. So far as he knew no key had ever been provided by the company. He was instructed on November 14th to cut the cable, and on his instructions that was done on November 15th. On November 18th he gave instructions for the defendants' gear in the transformer house to be removed.

Mr. Leslie E. Dyke gave evidence that on November 18th he removed the defendants' gear from the transformer house. At that time he found the door locked, but after removal he left the door unlocked.

Major H. Richardson, a director of the defendant company, and general manager of the Metropolitan Electric Supply Co., gave evidence as to a conversation he had with Mr. Hood Barrs on November 10th, 1932. The conversation turned on the question of the ownership of the transformer. Mr. Hood Barrs at first claimed that the transformer belonged to his company, but afterwards he understood Mr. Hood Barrs had altered his opinion. At that interview on November 10th, Mr. Hood Barrs had never said that the points were alive and that that caused his company great expense. The defendants would have been prepared to give the plaintiffs a single-phase supply temporarily. He and Mr. Hood Barrs discussed the subject of tariffs for a considerable time, but the prices suggested by Mr. Hood Barrs were impossible.

At the conclusion of the evidence and the addresses of counsel, his lordship, in giving judgment, having stated the facts, said that on August 6th the current was cut off but the cable remained and remained alive, and in that condition was dangerous to anyone who came into contact with it. The real dispute between the parties was that Mr. Hood Barrs was anxious to obtain special terms for supply, but his sug-

gestions as to that were refused by the defendant company. The parties failed to come to terms. Where there was a conflict he preferred the evidence for the defendants to the evidence for the plaintiffs. There was never, in his opinion, a time when it was not hoped that some arrangement for an electricity supply to the plaintiffs might be arrived at. If an arrangement had been arrived at it was reasonably clear that there would be a saving of time if the gear were left on the plaintiffs' premises. He was satisfied that what was done was done with the consent of the plaintiffs. He found that the plaintiffs had suffered no real damage by what had been done. If he had been compelled to find that the plaintiffs had suffered any damage he would have assessed it at 40s. The action would be dismissed.

Mr. Roland Oliver said the defendants had paid into Court the sum of £5, and he asked that that sum should be paid out to the defendants. His Lordship assented, and directed that judgment should be entered for defendants with costs.

Parliamentary News (BY OUR SPECIAL REPORTER)

ON April 18th Captain Balfour asked the Under-Secretary of State for Air whether he could now make any further statement regarding the progress of experiments being carried on by the Air Ministry and the Electricity Commissioners for the purpose of determining the most effective and practical method of eliminating the danger to flyers from unilluminated pylons.

Sir P. Sassoon said that the experiments and investigations were still proceeding, but he was not in a position to give any further reply.

The Output of Electricity

On April 18th Mr. G. Hall asked the Minister of Transport if he would state the number of miles of main transmission lines now in operation and the output of electricity in Great Britain since the Electricity (Supply) Act was passed.

Mr. Stanley said that the transmission system of the Central Electricity Board, to which the hon. member presumably referred, consisted of about 4,000 miles of transmission lines, of which about 3,000 miles operated at 132,000 V and the remainder at 66,000 V and lower voltages. The greater proportion of the lines were now in actual operation, and he was informed that the whole would be brought into operation during the course of the current year. The output (units generated) of electricity in Great Britain by authorised undertakers in the years since 1926 was as follows:—

	Units generated Millions.
1927	8,234
1928	9,073
1929	10,294
1930	10,914
1931	11,413
1932	12,241
1933	13,554

North Wales Electric Power Bill

The North Wales Electric Power Bill, promoted to confer various further powers on the company, was considered on Tuesday, April 17th, and subsequent days, by a Select Committee of the House of Lords. Attention was first directed to a clause making changes in the method of valuation of the company's undertaking for local rating purposes. This was opposed by County Councils and local authorities in the company's area.

Mr. Tyldesley Jones, K.C., for the company, said that three hydro-electric power stations were operated at Cwm Dyli, Dolgarrog and Maentwrog. The installed capacity was 37,500 kW, and plant with a capacity of another 6,000 kW was being installed at Maentwrog. Since it began, the company had only paid a dividend in 1924 on some preference shares, which were afterwards converted into ordinary shares, and in 1931 and 1932 they paid dividends of 4 per cent. and 3½ per cent. They were now faced with very heavy assessments for local rates, and if they did not get relief the surplus of revenue, which enabled them to pay 3 per cent. in 1932, would be more than wiped out and the company would be left with a deficit. They were now being asked to pay in rates nearly three times as much as would be paid by a company which generated electricity by steam raised by coal. To remedy that position they asked to be allowed to make a 5 per cent. deduction on the cost of the works constructed for bringing water from the hills to the generating station.

Mr. Arthur Collins, financial adviser to local authorities, said the special allowance of 5 per cent. as working expenses proposed by the clause was calculated to place the hydro-electric station in about the same position as a steam station.

On April 18th, Mr. Arthur Hewitt, chairman of the North Wales and South Cheshire Joint Electricity Authority, was interposed as a witness, and said his authority had unanimously passed a resolution supporting the Bill. He himself took the view that they could not get a fully established system of electricity supply until the company was put on a footing where it could expand. The company lost the benefit of £55,000 of working expenses allowed to a steam station for the cost of coal on the present basis of assessment. They asked for an allowance of 5 per cent. on a capital of £1,819,000, which was the equivalent in their case of the generating plant of a steam station. That allowance would make a difference of £28,000 to the promoters. Even then they would pay, in future, £3,000 a year more than they paid in 1932.

Evidence in opposition to the Bill was given on Thursday.

Mr. Gerald Eve, chartered surveyor, said assessments were universally based on rental value. He did not agree that a steam generating station in this area would be in a better financial position than the promoters'. On the contrary, he thought a hydro-electric station would be in a slightly better position to remunerate capital.

Consideration of the Bill was continued on April 20th, when Mr. F. J. Wrottesley, K.C., addressed the Committee on behalf of county councils in opposition to the Bill. He said that if the clause changing the method of valuation of the company's property was allowed to pass, this undertaking, which for years had been substantially under-rated, would only pay rates on £35,000 instead of on £74,000 or £79,000; this would add a shilling to the county rates.

Mr. Tyldesley Jones, K.C., made his final speech on Monday last. He said the promoters were not seeking to deprive the local authorities of revenue which they had enjoyed in the past. It might be, however, that the committee, while feeling that they were entitled to some relief, might feel disinclined to take from the local authorities revenue which they would have been entitled to in the current year. That could easily be remedied. If the promoters got the 5 per cent. allowance on capital cost which they asked for, the present assessment of £35,684 would be reduced to £31,694. If, however, they substituted 4½ per cent. for 5 per cent. they would get a ratable value of £37,000, and rates payable on a basis of 13s. in the £ would be £24,200 instead of £20,603. The promoters had taken moorland with a very low ratable value and put on it works of a high ratable value. That was pure gain to the local authorities.

After the Committee had deliberated in private, the chairman announced that they had decided that the clause must be struck out of the Bill.

Consideration was next given to a clause providing that where bulk supplies of electricity were given to authorised undertakers the cost of transmission lines should be pooled and divided among the undertakers receiving the supplies. Mr. Tyldesley Jones said that the immediate effect would be a reduction in the company's revenue, but the advantage was that it would have the opportunity of supplying undertakings which, by reason of distance, would otherwise find the cost prohibitive.

Sir John Brooke said that the Electricity Commissioners had no objection to the clause. They recognised that the position of the promoters was peculiar because of the length of their transmission lines. Mr. Arthur Moon, K.C., and Mr. J. H. Thorpe, opposed the clause on behalf of Wrexham, Hawarden, Oswestry, and other undertakings. The Committee allowed the clause.

Petitions against clauses in the Bill permitting the company to lay mains in private streets and to construct sub-stations in streets were withdrawn on amendments being inserted providing that the powers should not be exercised without the consent of the road authority. The Bill as amended was ordered to be reported for third reading.

The Wimbledon Agreement

On April 19th Mr. Mitcheson asked the Minister of Transport if he would state the date on which the Central Electricity Board came to a special agreement with the Wimbledon Corporation Electricity Department; what were the terms of the agreement; and by how much a year the revenue of the Central Electricity Board would suffer by this arrangement as compared with the revenue obtained if Wimbledon had been supplied from the grid at tariff rate.

Lieut.-Colonel Headlam, who replied, said he was informed that the arrangement referred to was concluded between the London and Home Counties Joint Electricity Authority and the Wimbledon Corporation on July 1st, 1933. The alternative method by which Wimbledon Corporation might have been brought into association with the national system would not have been a supply at tariff rates, but the selection of the Wimbledon station. He understood that the Joint Authority and the Central Electricity Board was satisfied that the arrangement concluded was more advantageous to the grid and the authorised undertakers receiving a supply from it than the alternative method mentioned.

Radio Diffusion

On April 23rd Mr. Liddall asked the Postmaster-General if he was prepared to appoint a departmental committee to consider the question of radio diffusion.

Sir W. Kirkwood said he presumed that his hon. friend referred to the relaying of broadcast programmes by wireless exchanges. The earliest date at which the licences for such exchanges were terminable was December 31st, 1936, and it would, in his opinion, be premature at the present time to consider the appointment of a committee to inquire into the system.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments, Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

British Diesel Contracts

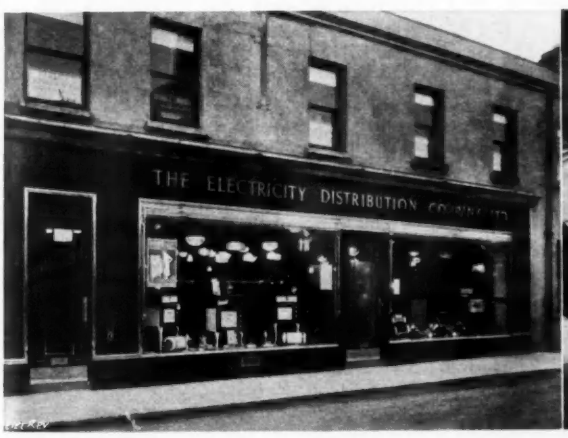
Gratifying reports persist from various quarters of improvement in the overseas business of British manufacturers. Messrs. Crossley Bros., Ltd., have been almost as long as we can remember universal providers of gas and oil engines, and it is not unnatural that now that revival is taking place their share of overseas contracts should rise substantially. We understand that during the past month they and their associated company, the Premier Gas Engine Co., Ltd., of Nottingham, received orders from all parts of the world aggregating more than 11,000 brake horse-power. A repeat order from an Australian gold mine brings up the oil-engine installation of the mine to eleven Crossley-Premier engines aggregating 7,700 b.h.p. The claim regarding the saving that can be effected over publicly supplied electrical energy is supported by the fact that the Crossley-Premier Diesels at the Lake View and Star Gold Mine, Australia, are saving £84,000 per annum. The Burmah Oil Co., Ltd., has placed an order for nine Crossley vertical Diesels with Mather & Platt pumps, each capable of dealing with 630,000 gallons a day.

Batteries for Norway to be Marked

The Norwegian Government has decreed that as from July 1st next all dry batteries and elements must be marked to indicate their origin by clear and durable stencilling or stamping.

An Irish Supply Company's Showrooms

Formed about two years ago, the Electricity Distribution Co., Ltd., a subsidiary of the Antrim Electricity Supply Co., has been actively engaged in developing the area of the two companies in the counties of Antrim and Londonderry. The local supply undertakings have been acquired at Ballyclare, Whitehead and Ballymoney, and the supply has been extended to Doagh, Cullybackey and Coleraine. The company has now taken over the Ballymena undertaking, and the opening of the new showrooms, offices and main stores in this town represents another step in its programme of intensified development of urban and rural areas. The building will accommodate the local staff and main stores and will serve as a central depôt for the mains, testing, rural and survey departments. The main showroom is used to display domestic apparatus of all types, and a large room on the first floor serves the dual purpose of demonstration room and showroom for the more expensive type of lighting fittings and appliances. Cooking demonstrations are given regularly, and a feature is an all-electric bathroom. For the wiring installation, which comprises 180 lighting and 70 power points and which was designed and carried out by the company's staff, over one mile of Henley cables were used. Exterior and interior views of the new showrooms are shown in the accompanying illustrations.



The new showrooms of the Electricity Distribution Co., Ltd., in Ballymena

Chinese Import Duties

Following the adoption of the metric system of weights and measures in China a new scale of import duties has been put into operation as from February 1st last.

A Merger

Hendersons Wireless and Electrical Service, Brighton, and the Delta Radio Distributors, Ltd., London, have been merged into a company with the title Hendersons Wholesale Electrical & Retail, Ltd. Mr. A. F. Phelp, who commenced the business of Hendersons in 1925, will be chairman of the new company, and Mr. D. G. E. Barrie, who joined Hendersons in 1930 and introduced electrical equipment and developed that side of the business, will take complete control of the electrical business of the new company. Mr. E. V. Bowers will control the London branch at Electric House, 1, Soho Square, W., where stocks of electrical accessories will now be carried. Hendersons already have depôts at Tunbridge Wells, Worthing and Eastbourne.

The New Warrington Showrooms

Imposing premises for the Electricity and Gas Departments of the Warrington Corporation were formally inaugurated on April 13th by the chairman of the Electricity and Gas Committees. There are three floors in the building devoted to showrooms. The main electricity showroom is fitted with a varied display of lighting fittings and domestic appliances, while a model shop window in which a colour-changing lighting system has been installed has been provided for the use of tradesmen. On the first floor a room has been set apart for the display of cooking and kitchen equipment, and adjoining it is a lecture theatre where demonstrations and lectures will be given on electric cooking and other subjects. On the second floor is a model house, the reception hall of which looks out on to a charming vista enhanced by floodlighting. Opening out from this hall are model rooms. In the kitchen are a cooker, water heaters, a washer, and other appliances for the kitchen, shown in their natural surroundings. The dining room, which has a red, tiled floor, is equipped with electrical appliances suitable for such a room, the equipment in the bedroom including an inset electric fire, while the bathroom has an illuminated shaving mirror, a heater, and a centre light. Pictures of the new showrooms appear on page 595.

Heating of Doncaster Baths

Considerable modifications are being made to the Grey Friars Road Baths, Doncaster, which have hitherto been supplied with steam from the Corporation's main generating station. In view of the possibility of the Corporation coming to terms with the Central Electricity Board, which would enable it to shut down the generating station during certain periods, it has been considered advisable to make other arrangements for the heating of the swimming pool and building generally. It has therefore been decided to instal an electrode steam boiler for the purpose. The contract for this work has been placed with Messrs. Saunders & Taylor, Ltd. The electric heating equipment will be supplied by Messrs. Bastian & Allen, Ltd., London, under the direction of Mr. R. E. Ford, engineer and surveyor to the Doncaster Corporation, and Mr. T. W. Hibbert, the borough electrical engineer.

Standard Switchgear, Ltd.

We are informed that at the annual meeting of Standard Switchgear, Ltd., a private company, held on March 17th, the accounts for the year, after providing for depreciation, showed an increased profit over that of the previous year and a considerable increase in assets. Sales were better by 26 per cent. notwithstanding the state of trade.

Markets for Radio Apparatus

The Department of Overseas Trade has just issued two confidential reports relating to the markets for radio apparatus in Spain and Roumania respectively. In the former country the demand has grown considerably since the Department's previous report in 1932, and it is stated that an intensive advertising campaign on the traditional characteristics of United Kingdom products would bear fruit. English manufacturers refuse to be guided by the local conditions prevailing in Spain, the greatest factor in the failure to capture an appreciable

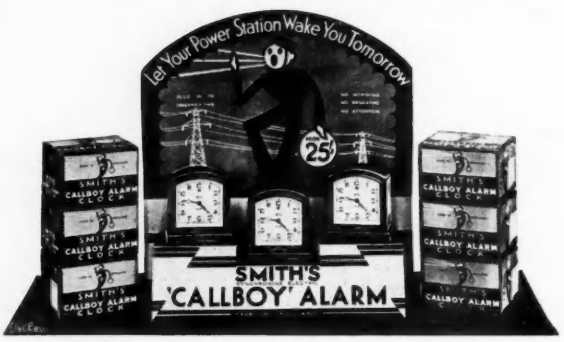
share of the market being that of price. The present moment appears to be most propitious for the introduction of British-made apparatus into Roumania in view of the favourable treatment enjoyed by the United Kingdom in respect of import and exchange permits. Firms wishing to extend their sales in this market would probably be well advised to appoint a general agent or, better still, to open their own selling branch in Bucharest.

Electricity and Gas Co-operation in Germany

The respective associations representing the suppliers of gas and electricity in Germany are provisionally uniting for the purpose of establishing, in conjunction with the local authorities who own supply undertakings of one kind or the other, a board or council of energy for the promotion of the interests of the two sources of energy in common.

An Electric Clock Campaign

In connection with a sales campaign advocating the use of electric alarm clocks, Smith's English Clocks, Ltd., have prepared a special "Callboy" showcard, which we illustrate herewith. The company is also offering to retailers six dummy boxes with every half-dozen synchronous alarm clocks stocked. It is stated that more business is done in alarm clocks than any



The "Callboy" showcard of Smith's English Clocks, Ltd.

other type, and for this reason these and other special aids are being offered during April and May. There is also a window competition. Twelve hundred Smith's synchronous clocks are now being installed at Thames House, Millbank.

Northmet Publicity

The employment of electricity for water heating, cooking, and other domestic purposes should receive considerable encouragement in the supply area of the North Metropolitan Electric Supply Co. as a result of an extensive publicity campaign just launched. In addition to large-size advertisements appearing in no fewer than eighteen local newspapers, attractive blue and black transparencies have been prepared for use in tramcars, and with all consumers' accounts are being sent leaflets describing the company's showroom service. On the accounts themselves, too, appear exhortations to consumers to use electric water heaters and washboilers. Furthermore, a brightly coloured folder is being sent out to consumers together with a letter offering a seven days' free trial of various electrical appliances, such as kettles, irons, fires, toasters, clocks and hair-driers. With regard to the Press advertisements, photographs of the various apparatus being demonstrated have been used with excellent effect in conjunction with such slogans as "Electric cooking—cleanest of all"; "Electric cooking is best—there's no doubt about it"; "Cook by electricity—cheap, simple, clean"; "On the line in no time with a Northmet electric washboiler." Two advertisements bearing the heading "Electricity at Home" point out various ways in which electricity can be of use in the living room and the kitchen.

Electricity Publicity in Somerset

On the back of account forms sent out by the South Somerset and District Electricity Co., a subsidiary of the British Power & Light Corporation (1929), Ltd., advantage is taken of increasing the goodwill with consumers by printing a personal message of assistance from Mr. H. S. Prowse, the engineer and manager, together with his portrait

Recent Contracts

Following the success achieved at the Eucharistic Congress in 1931, Standard Telephones & Cables, Ltd., have received an order for a complete public address equipment for the Eucharistic Congress to be held this year in Buenos Aires. This will necessitate the use of 200 loud speakers with amplifiers and power equipment, and the system will enable over one million persons to participate in the proceedings. Other recent public address equipment contracts received by Standard Telephones & Cables, Ltd., are for the Aldershot Tattoo and the Northern Command Tattoo.

Rose Street Foundry and Engineering Co., Ltd., Inverness, has received an order from the Austin Motor Co., Ltd., for two large resistance welding machines for the welding of back-axle casings of motor cars. One of the machines is capable of turning out as many as from 60,000 to 70,000 rims a week. Another order for welding machines has been received from a firm which is carrying out a housing scheme in Liverpool costing over a million pounds. The machines will be used for the welding of steel window frames for houses.

Steatite & Porcelain Products, Ltd., has received an order from the Public Works Department, New Zealand, for the supply of 21,000 suspension insulators for use on the 110-kV transmission lines which are to be erected in connection with the Waitaki and Mangahao hydro-electric schemes.

The Cambridge Instrument Co., Ltd., has recently received orders for dial thermometers to be installed on the British warships *Neptune, Ajax, Amphion, Apollo,* and *Phæton*; and also on H.M. submarines *Shark, Snapper, Sealion,* and *Salmon.*

The English Electric Co., Ltd., has been awarded a contract by the Bradford Corporation for twenty-one "A.E.C.-English Electric" trolley buses. These vehicles will be of the four-wheel, double-deck type, with rear entrance and having seating capacity for sixty passengers. The bus bodies will be of standard all-metal construction, and will be built at the English Electric Co.'s Dick, Kerr Works, Preston. The electrical equipment will comprise an 80-h.p. regenerative motor with contactor control, made at the company's Bradford works. The chassis will be supplied by the Associated Equipment Co. and will be its model "661T." This order makes a total of seventy-four vehicles supplied or on order for the Bradford Corporation with English Electric equipments.

Social Event

The annual championship sports and gala of the General Electric Co., Ltd., will be held on the company's sports ground, Preston Road, Wembley, on June 23rd.

Wages in the Electricity Supply Industry

At a meeting of the National Joint Council for the Electricity Supply Industry at the Ministry of Labour on April 20th the reports from the nine areas involved in the proposed restoration of wage cuts were considered. It was agreed to restore the wage reductions made two years ago in all districts as from the first full pay period in May. It is estimated that this will involve an increase of at least £180,000 in the wage totals for the men concerned.

Mining Type Transformers

We regret that owing to a printer's error the inscription to the illustration of the B.T.H. transformer on page 564 of our last issue stated that the transformer had an eight-legged core "to obtain specially low *heat*." The last word should, of course, have been "height."

Siamese Electrical Imports

Imports of electrical goods and apparatus (including machinery) into Siam fell from Ticals 4.5 millions (11 Ticals =£1) in 1931-32 to Ticals 1.88 million during 1932-33, says a recent memorandum published by the Department of Overseas Trade on the economic conditions in that country. The United States was the principal supplier with Ticals 0.53 millions, closely followed by Denmark with Ticals 0.41 millions; the United Kingdom's share amounted to Ticals 0.16 millions. During 1933 the Department of Public Health called for tenders for electric generating plants in the provinces, and most of the contracts were awarded to United Kingdom manufacturers.

A Cable-jointing Competition

At a meeting at Swansea of the West Wales branch of the Association of Mining Electrical Engineers it was announced that a cable jointing competition, open to all colliery electricians, would be included in the programme of events at the Welsh National Eisteddfod, which is to be held at Neath (Glam) in August next.

Lewcos Arts and Crafts Exhibition

Last Saturday the London Electric Wire Company and Smiths, Ltd., held an arts and crafts exhibition at its Leyton Works. The intention of the organisers was to stimulate greater interest in home crafts and art, by arranging the exhibition in a form of a competition, in which three prizes were given in each of the fifty-eight classes.

Modern Welding Equipment

In the article bearing the above title, which appeared on page 555 of our issue of April 20th, the second paragraph should have ended with the words, "with quick or flash welding there is considerably more upset" (not "less" as printed).

Markets for Traffic Signals

The Department of Overseas Trade has just issued three reports relating to the market for road signalling apparatus in the United States, Portugal and Chile respectively. While for a number of reasons the United States offers no market for British-made signalling apparatus, the report relating to that country by demonstrating the extent of American developments in this field will enable United Kingdom manufacturers to gauge the competition they are likely to encounter from this source in the markets of the world. Problems of road traffic hardly occur in Portugal except in Lisbon and Oporto; in the former city one British-made apparatus was erected a short time ago, and it is probable that Lisbon Council will give further orders and that Oporto will follow suit. With regard to Chile, the volume of traffic in Santiago and Valparaiso is never so great as to occasion the police any difficul-

ties, but it is considered worth while furnishing the local authorities with further particulars of these devices and exploring the matter further.

Calendar

The calendar of the S.W. & S. Electric Power Co. and the South Wales Power Co. is adorned by a majestic picture of two hounds. The large monthly sheets, with the preceding and following months on either side, cover the period April, 1934, to March, 1935.

Modern Showrooms at Swindon

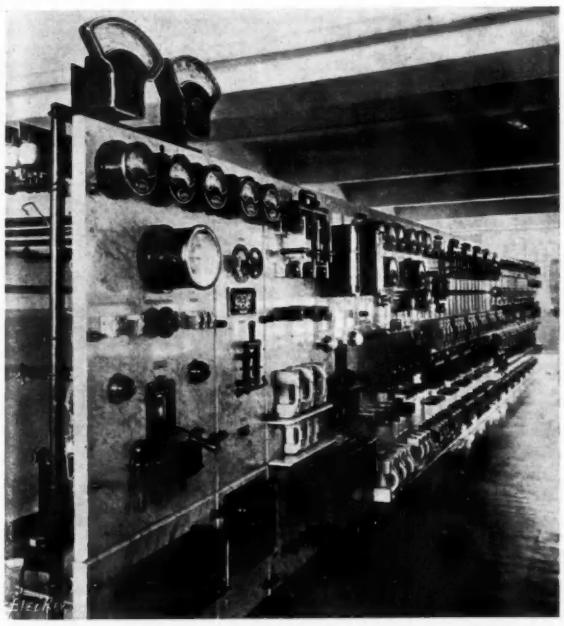
The new Corporation electricity showrooms at Swindon, which have cost £8,000, were opened on April 19th. An attempt has been made to design a building distinctive in itself to draw attention to its purpose.

The front is faced with local multi-coloured bricks, pointed with special coloured cement and brick on the edge. Stainless steel windows are placed against a background of black marble, which is in turn framed into a surround of a facia of polished golden travertine stone. The lettering on the front of the building is executed in vivid blue. Ornamental stainless steel grilles and the elaborate and beautifully made showroom doors provide the necessary decorative relief to the severe treatment of the brickwork. Externally, a striking effect has been obtained by the use of neon tubing. The windows are floodlighted by batteries of coloured lights, and the showroom is brilliantly illuminated. Nearly the whole of the ground floor is devoted to the showroom, and the passer-by has a comprehensive view of the whole of the interior. Fixtures and metal showcases and shelves line the walls. These fittings are illuminated from inside, and amber reflectors enhance their attractiveness.

Opposite the main entrance a staircase leads to the demonstration room, and this is used as a background to the specially designed heating and lighting panel, round which is placed furniture in the advanced modern style. Illuminated windows and skylights are placed on the stairway leading to the demonstration rooms, to which access is also given by an automatic electric lift. This room has been designed for demonstrating the latest cooking methods and types of electrical appliances and will seat forty people. The platform is fitted with a kitchen sink, cooking cabinet and various types of cookers mounted on turntables to facilitate demonstration of the various points to the audience. The building is heated throughout by electricity, which also provides a hot-water supply. The main heating installation is by an electrical thermal storage system.

Electricity and Newsprint

The new West Australian Newspaper House at Perth has no fewer than 1,400 lighting points, as well as 150 power points. Mr. Mason, the chief electrical engineer of West Australian Newspapers, Ltd., supervised the electrical work involved throughout the premises, and employed G.E.C. materials almost entirely. For general lighting, dispersive reflectors, equipped with "Osram" lamps, are chiefly adopted, and approximately 100,000 yds. of Pirelli-General wire and cable forms part of the equipment. "Landor"

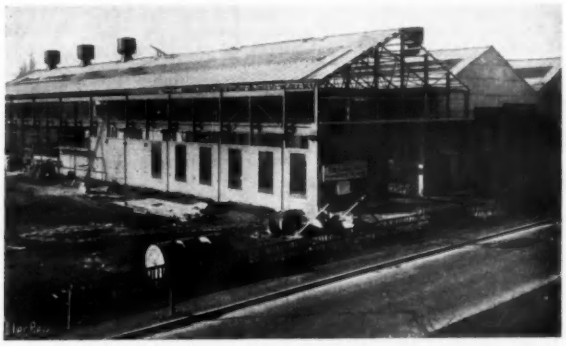


The main switchboard at the West Australian Newspaper House, Perth

switches, "Neata" fuses, and bakelite moulded accessories, in large numbers, also figure in the installation. The main offices are illuminated through a spacious lay-light, over which "Gecoray" reflectors are mounted, and by fluted spherical wall brackets equipped with 300-W lamps; similar wall brackets with 100-W lamps are fitted for lighting the mezzanine floor. The extensive plant in the machine room includes a huge six-unit Crabtree press, and this relies for its motive power on two 125-h.p. twin-motor Witton-James equipments, while the main switchboard is built up exclusively of Witton switchgear.

Derby Cables Extensions

Among the sure indications of reviving trade are the extensions of electrical and other manufacturing works that it is



A new addition to the works of Derby Cables, Ltd.

our pleasure to record. In the accompanying illustration we show the latest addition that has been made to the works of Derby Cables, Ltd., at Derby.

Wages in the Cable-making Industry

The Joint Industrial Council for the Cable-making Industry announces that there will be no "cost-of-living" alteration in wages paid in the industry on the third pay-day in May.

Price of Materials

The following prices are only general, and they may vary according to quantities and other circumstances :—

CHEMICALS, ETC.	Price, April 25th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash Chlorate ... ... per lb.	3½d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£4 18s.	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals —		
Grade I ... ... per ton net	£214	£3 dec.
Grade II ... ... ,,	£146	£2 dec.
Grade III ... ... ,,	£69	£1 dec.
c Brass (rolled metal 2" 10 12" basis)... per lb.	7d.	—
c ,, Tubes (solid drawn) ... ... ,,	9d. to 9½d.	—
c ,, Wire, basis ... ... ,,	7¼d.	—
c Copper Tubes (solid drawn)... ... ,,	10d.	—
g ,, Bars (best selected)... ... per ton		
g ,, Sheet ... ... ,,	£62	—
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£36 5s.	15s. dec.
g ,, ,, Sheets ... ,,	£36 5s. to £36 15s.	5s. dec.
d ,, ,, Wire Rods ... ,,	£43	10s. inc.
d ,, ,, H.C. Wire ... per lb.	7 7/8 d.	1/8 d. dec.
f Ebonite Rod ... ... ,,	1/3 to 1/6	—
f ,, Sheet ... ... ,,	1/3 to 1/6	—
n German Silver Wire ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para fine ... ... ,,	5¼d.	¼d. inc.
i Iron, Pig (Cleveland No. 3)... ... per ton	62/6	—
i ,, Wire galv. No. 1, P.O. qual. ... ,,	£20	—
g Lead, English Pig ... ... ,,	£13	5s. inc.
g Mercury ... ... per bot.	£10 15s. to £11	—
c Mica (in original cases) small ... per lb.	6d. to 3/6	—
e ,, ,, medium ... ,,	4/- to 8/-	—
e ,, ,, large ... ,,	8/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	11d.	—
p ,, ,, rolled strip & sheet ,,	11d.	—
p ,, ,, wire ... ... ,,	1/-	¼d. inc.
o Platinum ... ... per oz.	£7 15s.	—
d Silicium Bronze Wire ... ... per lb.	8¼d.	1/8 d. inc.
s Steel, magnet, in bars ... ... ,,	7¾d.	—
m Tin, Block (English)... ... ... per ton	£240 10s. to £242 10s	5s. dec.
g ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Cutta Percha and Telegraph Works Co., Ltd.
g James & Shakespeare.
h Edward Till & Co.
i Bolling & Lowe.
l Richard Johnson & Nephew, Lt.
m P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. R Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notes" under the same heading.

New Catalogues and Lists

Rhodes, Brydon & Youatt, Ltd., Waterloo Engineering Works, Gorsey Mount Street, Stockport.—Publication No. 175, illustrating and describing "Mopumps."

M. & C. Switchgear, Ltd., Kelvinside Works, Kirkintilloch, Glasgow.—Particulars of direct-starting panels and push-button switches.

Brook Motors, Ltd., Empress Works, Huddersfield.—A pocket stock list of motors.

Cressall Manufacturing Co., Ltd., Birmingham.—A leaflet on flat ribbon resistance grids.

Newton & Wright, Ltd., 471, Hornsey Road, N.19.—A pamphlet on shockproof mobile X-ray units.

Crossley Bros., Ltd., Openshaw, Manchester.—The "Crossley Chronicle," containing particulars of the *Electric Star* ferry boat.

Electradix Radios, 218, Upper Thames Street, E.C.4.—An 80-page catalogue of apparatus available.

Wardle Engineering Co., Ltd., Old Trafford, Manchester.—A catalogue of Wardle "Prismats."

Medical Supply Association, Ltd., 167, Gray's Inn Road, W.C.1.—Leaflets dealing with the new "Milliwatt" electric cushion and "Zotofoam" equipment.

William McGeoch & Co., Ltd., 46, Coventry Road, Birmingham.—A comprehensive catalogue of modern tubular fittings.

Batteries, Ltd., Hunt End Works, Redditch.—A description of the "Nife" emergency lighting system in the *Empress of Britain*.

Henry Simon, Ltd., Cheadle Heath, Stockport.—A well-produced 60-page art catalogue of mechanical handling equipment.

"Diamond H" Switches, Ltd., Gunnersbury Avenue, W.4.—A catalogue of "Diamond H" switches and Bulletin 11A, describing a special type of three-heat series-parallel switches for cookers.

British Insulated Cables, Ltd., Prescot.—Catalogues of iron-clad service cut-outs, cast-iron sealing chambers and servce cut-outs with non-conductive cases.

Sir W. G. Armstrong Whitworth & Co. (Engineers), Ltd., Scotswood Works, Newcastle-on-Tyne.—A 20-page catalogue of pneumatic chipping hammers.

J.B. Electrical Co., Ltd., 55, Victoria Street, S.W.1.—A complete catalogue of the company's lines.

National Gas & Oil Engine Co., Ltd., Ashton-under-Lyne.—Catalogues of oil-engines and the "National Bulletin."

The stand of the Revo Electric Co., Ltd., at the West Bromwich Exhibition described in our last issue

Dominion Electrical Co., 31, Windmill Street, W.1.—A pamphlet on the "Lumiflex" insulated moulded link system.

Edison Swan Electric Co., Ltd., 155, Charing Road, W.C.2.—A leaflet (L.927) on architectural lamps.

Marryat & Scott, Ltd., 75, Clerkenwell Road, E.C.1.—An illustrated pamphlet dealing with Marryat & Scott lifts.

Drake & Gorham Wholesale, Ltd., 77, Long Acre, W.C.2.—A catalogue of vacuum-cleaners (Cat. No. 531).

Bankruptcy Proceedings

J. H. K. Reynolds, "Leylands," Broadstone, late of Poole, Dorset, and Bournemouth, Hants, wireless dealer.—The public examination herein was continued at the Law Courts, Bournemouth, recently. Debtor appeared in custody. The previous hearing had been adjourned for debtor to lodge cash and goods accounts; he had complied with the order, and stated that during the whole period of trading the purchases were £2,472, and the sales amounted to £2,085. Hire-purchase sales totalled £377. When execution was levied debtor said that the value of his goods at that time was approximately £450. The gross profit on trading was £553, and debtor estimated his overhead expenses at about £35 weekly. The Official Receiver observed that from the records which debtor kept it was impossible for him to account for his existing deficiency. The examination was adjourned *sine die*.

T. Ward, radio and battery engineer, 7b, Richmond Street, Bridlington, Yorkshire, formerly 15, Princess Street, Bridlington.—The public examination was held at the Court House, Scarborough, on April 17th. A statement of affairs had been returned which showed gross liabilities of £425, of which £339 was expected to rank for dividend, and there were net assets of £77, leaving a deficiency of £262. Debtor attributed his failure to living above his income and incurring debts before starting business. The examination was closed.

T. F. Jarrett (trading as T. F. Jarrett & Co.), electrical engineer, 14, Springcopse Road, Reigate, and 63, High Street, Reigate, Surrey.—The receiving order was made recently on the debtor's own petition, and according to the statement of affairs lodged there are gross liabilities of £3,714, of which £2,890 is expected to rank for dividend, and there are net assets of £396, leaving a deficiency of £2,474. Debtor attributes his position to the heavy liabilities taken over, and to general depression in trade and lack of capital.

J. D. England, radio engineer, 21, Grosvenor Road, Bradford.—Receiving order made April 12th on debtor's own petition. Public examination May 25th at the County Court, Bradford.

E. C. Wood (Radio Equipment Co.), wireless dealer, 15, Brook Street, Chester.—Receiving order made April 12th on debtor's own petition. First meeting, May 1st, at the Official Receiver's office, St. Peter's Churchyard, The Cross, Chester. Public examination May 15th at the Castle, Chester.

J. H. K. Reynolds, wireless dealer, 208, High Street, Poole, and at Castle Road, Bournemouth.—Last day for receiving proofs for dividend May 2nd. Trustee, Mr. C. J. Pyke, Midland Bank Chambers, High Street, Southampton, Official Receiver.

H. H. Edwards, electrical engineer, 25, Churchfields, Wellington.—Last day for receiving proofs for dividend May 2nd. Trustee, Mr. W. R. Cocks, Exeter Bank Chambers, Broadgate, Exeter, Official Receiver.

F. E. Kinzett (F. E. Kinzett & Son), wireless factor, 54, Fielding Road, Chiswick.—First and final dividend of 5s. 7d. in the £, payable April 27th at 29, Russell Square, W.C.

E. V. Day, radio dealer and radio engineer, 16, King Street South, Chesterfield.—First and final dividend of 1s. 0½d. in the £, payable April 27th at 22, Regent Street, Nottingham.

J. E. Ridgway, electrical and radio engineer, Hightown, Congleton, and at 32, High Street, Biddulph.—First and final dividend of 1s. 7d. in the £, payable April 25th at 12, Lonsdale Street, Stoke-on-Trent.

M. Chester, wireless and electrical dealer, 186, St. Paul's Road, Balsall Heath, Birmingham.—Receiving order made April 16th on a creditor's petition.

E. H. Goldie (Dudley Radio & Electrical Service), radio engineer, "Dunkerque," The Parade, Dudley.—First meeting, April 27th, at 1, Priory Street, Dudley. Public examination, May 17th, at the Court House, Dudley.

R. Phœnix (Monarch Radio Service), radio dealer, 28, Tramway Street, Leeds.—First meeting, April 30th, at 24, Bond Street, Leeds. Public examination, May 29th, at the County Court House, Leeds.

F. Lockett, electrical dealer, 45a, Parrs Wood Road, Didsbury, Manchester.—Trustee, Mr. F. Murgatroyd, Byrom Street, Manchester, Senior Official Receiver, released April 5th.

A. J. Gridley (A. J. Gridley & Co.), electrical engineer, 170, Stockwell Road, S.W.1.—Last day for receiving proofs for dividend May 5th. Trustee, Mr. S. W. Hood, Bankruptcy Buildings, Carey Street, W.C., Official Receiver.

H. Bannister (Henry Bannister & Co.), electrical goods factor, 48, Old Moat Lane, Withington, Manchester.—Last day for receiving proofs for dividend May 2nd. Trustee, Mr. N. McKellen, 20, Booth Street, Manchester.

C. H. Fisher, electrical and wireless engineer, 3, New Road, Durrington.—First and final dividend of 1s. 9½d. in the £, payable at 12, Rolleston Street, Salisbury.

A. Senior and **H. Senior** (A. Senior & Son), Back North Terrace, Darlington.—First and final dividend of 2s. 6d. in the £, payable April 30th at 80, High Street, Stockton-on-Tees.

Company Liquidations

Onward Electrical Appliances, Ltd.—Meeting, May 18th, 329, High Holborn, W.C., to receive an account of the winding-up by the liquidator, Mr. M. G. Hacker.

Derbyshire & Nottinghamshire Electric Power Syndicate, Ltd.—Meeting, May 23rd, at 49, Moorgate, E.C., to receive an account of the winding-up by the liquidator, Mr. G. D. Prince.

Cleveland & Durham County Electric Power Co., Ltd.—Meeting, May 23rd, at 49, Moorgate, E.C., to receive an account of the winding-up by the liquidator, Mr. G. D. Prince.

John Kirkham, Ltd.—Winding up voluntarily. Liquidator, Mr. T. Greenhalgh, 23a, Clifton Street, Blackpool.

Rex Radio Corporation, Ltd.—Meeting May 28th at 45, Bloomsbury Square, W.C., to receive an account of the winding-up by the liquidator, Mr. J. S. Mason.

Dissolution of Partnership

Jaggar & Millington, wireless dealers and makers of wireless apparatus, 939, Leeds Road, Deighton, near Huddersfield.—Messrs. G. Millington and C. K. Jaggar have dissolved partnership.

Private Arrangements

S. Richards, electrical engineer, Lawkholme Crescent, Keighley.—The creditors met recently at Keighley, when the statement of affairs showed ranking liabilities of £1,533 due to unsecured creditors. After allowing £34 for preferential claims, the net assets were £239, leaving a deficiency of £1,294. The deficiency was attributed to depreciation of the stock, fixtures and fittings, and the loss on trading. It was decided that the matter should be dealt with under a deed of assignment to Mr. Wm. Thompson, of 21, Henry Street, Keighley, as trustee, with a committee of three of the principal creditors.

H. Boswell (trading as Reliance Service Depôt), wireless dealer, 151, Albert Road, Widnes, Lancs.—At the meeting of the creditors of the above, the statement of affairs showed liabilities of £693, of which £543 was due to the trade. The assets were estimated to realise £365, leaving a deficiency of £328. Friends of the debtor were prepared to guarantee a composition of 6s. 8d. in the £. A resolution was passed in favour of a deed of assignment being executed to Mr. Parkin S. Booth, accountant and auditor, 2, Bixteth Street, Liverpool, whilst a committee of three of the creditors was also appointed.

C. J. Parkin, electrical and wireless goods dealer, 74, St. Peter's Avenue, Cleethorpes.—At the meeting of the creditors, the statement of affairs showed liabilities of £816 due to the trade. After allowing £31 for preferential claims, the net assets amounted to £384, leaving a deficiency of £432. A resolution was passed confirming the deed of assignment already executed to Mr. E. P. Dutton, Bowlalley Lane, Hull, whilst a committee of three of the principal creditors was also appointed.

Electricity Supply

Lighting, Domestic, Power

Ashby Woulds.—ELECTRICITY REPLACES GAS.—The Urban District Council has decided to dispense with gas at the Council houses at the Crescent and to have electricity installed. Terms have been arranged for a supply with the Leicestershire and Warwickshire Electrical Power Co.

Ashton-under-Lyne.—LOAN.—Application is being made to the Electricity Commissioners for sanction to borrow £8,218 for the provision of new h.p. mains and an additional sub-station.

Anstruther.—ELECTRIC HARBOUR LIGHTING.—After a lengthy discussion at Anstruther the Harbour Commissioners have decided to light the harbour with electricity. The votes for gas and electricity were equal, only the casting vote of Provost Carstairs deciding the issue for electricity.

Aylesbury.—LOAN.—The Electricity Committee has received sanction to a loan of £15,000 for mains and services.

Bridport.—CORRECTION.—The capacity of the new Diesel alternator set which the Town Council proposes to install at the power station will be 430 kW, not 230 kW as stated in our last issue.

Brighton.—MAINS EXTENSIONS.—The mains are to be extended at a cost of £1,282.

LOAN.—In order to deal with the increased demand for electricity, and to avoid the cost of laying additional e.h.p. cables between the Southwick Power Station and North Road Works, the engineer proposes to step up the line voltage of the present h.p. system from 8 kV to 11 kV. The Committee is to apply for sanction to borrow £1,650 to defray the cost of three 6,000-kVA auto-transformers in connection with this work.

PURCHASE OF ELECTRIC WASH-BOILERS.—The Committee has come to an agreement with the Health Committee by which 184 electric wash-boilers now on hire on the Corporation's housing estates shall be purchased outright for £600.

Canada.—POWER FOR CANADIAN MANUFACTURING INDUSTRIES.—According to figures recently compiled by the Dominion Bureau of Statistics at Ottawa, more than 4,000,000 h.p. of industrial power was utilised in Canadian factories in 1931. Plants in Ontario utilised 1,629,588 h.p., whilst the total for Prince Edward Island was only 4,258 h.p. Electric motors operated by purchased power developed 2,587,411 h.p., in addition to 539,800 h.p., representing power generated in the industries themselves; the total motor capacity was, therefore, 3,127,211 h.p. The total industrial power employed was 4,114,677 h.p.

SHAWINIGAN WATER AND POWER COMPANY'S PROGRESS.—The *Financial Post* (Toronto) reports that the Shawinigan Water and Power Company established a record output of electrical energy last year, the company having found it necessary to hasten the completion of the initial development on the Upper St. Maurice River at Rapide Blanc. The Montreal correspondent of the same journal reports that the company has installed at the Rapide Blanc development on the Upper St. Maurice River the second of the four units of 40,000 h.p. each now being installed. The first unit was brought into operation earlier in the month. These units are not as yet operating to full capacity, but will do so on the raising of the water from the spring floods. The other two units are to be completed shortly, and by the middle of May all four units will be running at their full capacity of 160,000 h.p. Completion of the installation of the first two units increased the installed capacity to 809,200 h.p., whilst with the completion of the other two units the installation will be able to produce 889,200 h.p. The additional power is being readily absorbed in order to meet the increasing power load in the territories served by the Shawinigan system.

Cheadle and Gatley.—LOAN.—The Urban District Council has applied for sanction to a loan of £3,750 for the erection and equipment of a sub-station on the Torkington Lodge Estate at Gatley. The station will enable the Council to give a supply for any future building developments which may be carried out in the district.

Chester.—BULK SUPPLY CHARGES.—The Electricity Committee has decided that a tariff should be adopted for giving a bulk supply of electricity at the rate of £4 per annum per kW of maximum demand, plus 0.4d. per kWh.

LOAN.—The Electricity Committee is seeking sanction to borrow £30,000 for mains and services in connection with extension works in the area of supply.

Croydon.—REDUCED CHARGES.—The Electricity Committee recommends the reduction of the flat rate charge for electricity from 6d. to 5½d. per kWh.

EXTENSIONS.—The Committee is to extend distributors in the Firsby Avenue district (£262), Verdayne Avenue district (£425), and in the Southern Avenue district (£635). The Committee is also to extend other mains at a cost of £1,802.

Erith.—MAINS EXTENSIONS.—The Urban District Council has received sanction to a loan of £26,987 for mains extensions. A supply is to be afforded to Burndept, Ltd., who have acquired premises in the town.

Fleet.—INQUIRY.—A Ministry of Transport inquiry was held last week regarding the application of the Mid-Southern District Utility Co. to erect overhead wires at Crookham. Mr. H. C. Allerton, the company's deputy-electrical engineer, said that the cost of overhead lines would be £80, against £182 for underground mains, and the revenue per annum was £38 gross. The scheme was an extension of an overhead line in the area of the Hartley Wintney Rural District Council, which had not raised any objection. It would not interfere with the amenities of the district as alleged by the Fleet Council, which opposed the application.

Gravesend.—ALL-ELECTRIC HOUSES.—Following a visit to all-electric flats at St. Pancras, a deputation from the Housing Committee suggests that a number of all-electric houses shall be built upon the West Court Farm Estate, upon the principle of one fire with back-boiler, electric cooker, wash-boiler and fires in bedrooms. The electrical engineer suggests that these be installed and the fixed charge and hire rental be included in the weekly rental. A simple pre-payment meter could be supplied charging ½d. per kWh, and under these conditions he would not expect the charge through the meter to exceed 2s. per week.

A view of London Road, Lewisham, showing the new "Osira" lighting

Harrow-on-the-Hill.—UNUSUAL TARIFF.—The Harrow Electric Light Co., Ltd., has decided to revise the present tariff to a charge of 4d. per kWh for a given amount of electricity, to be determined according to the size of the house, and ¾d. per kWh thereafter without a fixed charge. No alternative tariff is available. Efforts are also being made to stimulate the domestic load and a series of cooking demonstrations are being held, all users of electricity receiving a personal invitation. These developments have followed closely the acquisition of the undertaking by the North Metropolitan Electric Power Supply Co., and the tariff was introduced by Mr. W. H. Bishop, manager of the Harrow Company.

India.—DEVELOPMENTS IN TRAVANCORE.—The Government authorities of Travancore are interesting themselves in an important hydro-electric scheme for the supply of electric power within the State and neighbouring areas. It is proposed to harness the waters of the River Munnar near Pallivasal on the Western Ghats and to transmit the power up to Kottayam, in addition to supplying a number of tea estates in the vicinity of the generating station, which have at present their own electric power plants. The water from the river will be diverted and led through a tunnel about two miles long through the ghats into an open channel which will finally deliver the water into a forebay designed as a spillway tank. Two penstocks will carry the water from the forebay to the turbines. The initial installation will comprise three 5,000-kVA generating sets, one of which will be kept as a standby. The scheme is scheduled for completion by 1936. The power will be transmitted from Pallivasal to Kottayam, a distance of about seventy-four miles, by a 66-kV line. A 66-kV line will also extend from Kottayam to Peermade to serve the plantations, while a 33-kV line will be taken to Alwaye. For local distribution, the voltage will be stepped down to 11 kV.

London.—BATTERSEA.—The Electricity Committee is to provide electricity services to 122 premises at an estimated cost of £1,186.

FULHAM.—The Electricity Committee proposes to seek sanction to borrow £817 for the provision of a sub-station at the laundry premises of Messrs. William Whiteley, Ltd., and £1,421 for the erection and equipment of a sub-station in Fulham Road.

ST. PANCRAS.—The Electricity Committee is to extend mains in the Regent's Park area at a cost of £1,470.

METROPOLITAN WATER BOARD.—The Works Committee of the Metropolitan Water Board reports that the Hammersmith pumping station was constructed by the West Middlesex Waterworks Co. about the year 1810. Nine of the boilers have been in use for over fifty years, and the boiler insurance company has expressed the opinion that they are not suitable for further

use, and it is proposed to install a steam turbine in an extension of the present Leavitt engine house. The turbine would be required to drive, through gearing, two centrifugal pumps and a 250-kW electric generator. The electricity generated would be used for driving auxiliary machinery in the works and two units each capable of pumping two and a half million gallons per day against a head of 180 ft.

LEWISHAM'S "OSIRA" STREET LIGHTING.—The last section of a seven-mile installation of "Osira" street lighting has been put into operation by the South Metropolitan Electric Light & Power Co., Ltd. This is said to be the largest installation in the world employing high-pressure mercury-vapour lamps. It illuminates the whole area of the roadway, the kerbs, and the side paths, and provides good visibility for a full quarter of a mile ahead on straight sections. The specially designed G.E.C. "Lewisham" lanterns are mounted 25 ft. above the roadway on steel columns, and are suspended from the bracket-arms which project 5 ft. over the roadway. The poles are 34 ft. 6 in. long, and sunk 4 ft. into the ground. Many of them were made with specially shaped flattened or cranked roots for clearing underground service mains. They are spaced at 160/170-ft. intervals on each side of the road, and carry all-night pilot lighting equipment. The Lewisham installation consists of 224 units, 143 being on 200-V and 81 on 230-V a.c. supply; they are all automatically controlled by synchronous motor-driven time switches fitted with astronomical or solar dials and compensating device whereby variations in time of lighting up and extinguishing are controlled. This system also controls the switching on and off of the all-night pilot lighting.

STOKE NEWINGTON.—The Borough Council has recommended that an application should be made to the Electricity Commissioners for sanction to borrow a sum of £5,000 for electricity meters.

SHOREDITCH.—The Electricity Committee has recommended that the charge for electricity for heating be reduced from 1d. to ¾d. per kWh. The Committee has also recommended the introduction of an "All-in" tariff of a fixed charge of 6s. 6d. per quarter for a minimum of four rooms, with a charge of 1s. 6d. per quarter for each additional room, plus a "unit" charge of ¾d., subject to a minimum consumption of 40 kWh for each of the summer quarters and 60 kWh for each of the winter quarters. When the supply is given through a prepayment meter an additional charge of 1d. per week will be added to the standing charge. A schedule of charges has been prepared for wiring and appliances on hire.

The question of the revision of the charge for heating supplies in the borough, has been considered and the Electricity Committee has agreed to reduce the charge from 1d. to ¾d. per kWh.

FLOODLIGHTING THE NEW BATTERSEA POWER STATION.—An excellent example of exterior floodlighting has just been installed by the London Power Company at its new Battersea power station, and it can be seen quite clearly from all trains going to and from Victoria. The two massive chimneys which dominate the site are of reinforced concrete of light grey appearance, and rise to a height of 337 ft. above ground level. Special narrow angle Holophane projectors were designed to reach this height effectively, and the chimney on top can be seen from Banstead Downs, fourteen miles away, on a clear night. The main portion of the building, which is of rough sand faced brick is dark in colour—reflective factor 25 per cent.—but by the use of high intensity lighting this has been brought out quite prominently; an illumination intensity of 6-7 ft. candles is given uniformly over the whole frontage. The projectors used for the main frontage are of the Holophane "FL.1,000" pattern equipped with 1,000-W lamps, 110 being used to illuminate the north frontage. These projector units are of the latest design, incorporating a special pre-setting device, and exterior focusing arrangements to facilitate adjustment and maintenance.

Battersea Power Station floodlighted

Manchester.—PROGRESS DURING FEBRUARY.—The monthly report of the Electricity Department shows that 1,546 new consumers were connected during February, and 780 existing consumers applied for additional supplies, bringing the total number of applications to 2,326 representing 4,772 kW. Two hundred and sixty orders for cookers on hire were received and 195 were connected, bringing the total on circuit to 12,643. Corresponding figures for wash-boilers were 21; 120; and 604.

Newmarket.—SPECIAL ORDER.—The Electricity Commissioners have submitted to the Minister of Transport for confirmation a Special Order made by them authorising the Newmarket Electric Light Co., Ltd., to supply electricity in the Urban District Council's area.

Northern Ireland.—FINANCING THE ELECTRICITY BOARD.—A White Paper issued on April 19th states that the Ministry of Finance has given a guarantee in respect of a loan of £400,000 to be raised by the Electricity Board of Northern Ireland. The Ministry has already guaranteed a similar loan of £500,000 for the Board.

BELFAST.—The Corporation Electricity Committee is seeking sanction to raise a loan of £140,000 to cover the cost of installing a new 30,000 kW turbo-alternator plant at the Harbour power station, which is the main station generating current to supply the municipal area of Belfast as well as the Northern Ireland Supply Board's grid system. It is hoped that the alternator will be ready for the winter of 1935. During the year ended March 31st, 1934, the amount of electricity sold increased by 16,981,687 kWh over the previous year. The peak load for the winter of 1932-33 was 33,200 kW whilst that for last winter was 42,600, representing an increase of 9,400 kW.

PORTSTEWART.—The Urban District Council has decided to reduce the charge for electricity for lighting from 8d. to 6d. per kWh.

Pontypridd.—INQUIRY.—Mr. H. Nimmo, chief engineering inspector of the Electricity Commission, held an inquiry on April 18th into an application by the Urban District Council for sanction to borrow £6,900 for installation of a new 1,000 kW d.c. generating set at the council's generating station. Mr. S. D. Herington, for the South Wales Electric Power Co., which opposed the application, said that the Council could purchase the energy it required in bulk from the company and that the capital expenditure involved in purchasing the new generating set could be avoided. Mr. G. J. Evans, manager of the Council's electricity undertaking, submitted figures to show that with the new plant the Council would be able to generate electricity at a lower price than it was at present, purchasing a part supply from the Power Co.

Portsmouth.—BULK SUPPLY CHARGE.—The Town Council, in response to an application from Fareham Urban District Council for a revision of charges for a bulk supply, has reduced the price for all energy in excess of one million kWh per annum by 10 per cent.

Suffolk.—ELECTRICAL PROGRESS.—With the exception of Lowestoft, Suffolk obtains practically the whole of its electricity from Ipswich, as a centre, and certain towns in the county have for a long time had a supply available, but there are wide areas wherein development only commenced about five years ago. The Ipswich Corporation, therefore, made inquiries with the object of discovering whether Suffolk was leading or lagging behind the rest of the country, and the results have been sent to us by Mr. H. E. Blackiston, the chief engineer and manager of the Ipswich Corporation Electricity Department.

The sections were divided according to the areas of (a) The Woodbridge and District Electric Light Co., Ltd.; (b) the East Suffolk Electricity Distribution Co., Ltd.; (c) Bury St. Edmund's Corporation; (d) Felixstowe Urban District Council; (e) The East Anglian Electric Supply Co.; (f) Ipswich Corporation (excluding sales to other undertakings). The increase in sales during the last four years has amounted to (a) 68 per cent.; (b) 322 per cent.; (c) 79 per cent.; (d) 156 per cent.; (e) 496 per cent.; (f) 47 per cent., making an average of 77 per cent.

Swansea.—MANUFACTURERS TO USE CORPORATION'S SHOWROOMS.—The Electricity Committee has given permission to certain manufacturers to use the Corporation's showrooms for the purpose of demonstrating their apparatus.

Sweden.—INCREASED OUTPUT.—In spite of the exceptional drought in 1933, the preliminary figures issued by the Swedish Waterfalls Board indicate that the supply of electrical energy increased by 9 per cent. over 1932, amounting to over 5,000 million kWh.

Swindon.—NEW FEEDER.—The Electricity Committee is seeking sanction to borrow £7,000 in connection with the provision of a stand-by e.h.p. feeder from Moredon power station to the main sub-station, together with additional switchgear, to ensure, in case of the breakdown of either of the existing feeders, an adequate supply to the Great Western Railway Co., the Wessex Electricity Co., and the town.

Thornton-Cleveleys.—ELECTRICITY CHARGES.—An all-round reduction in electricity charges has been announced by the Council. Mr. W. Betney, chairman of the Electricity Committee, said the charge per kWh would shortly drop from 6d. to 5d., and, in certain circumstances, to 4d. The "all-in" tariff charges would also be reduced to ½d. per kWh. The Council intends to abolish meter rents.

Torquay.—REDUCED CHARGES.—The Town Council has reduced the "unit" charge on the two-part tariff by ½d.

Tynemouth.—HIRE OF IRONS.—At a meeting of the Electricity Committee the electrical engineer reported that he had received many requests from tenants on the Ridges Estate to hire electric irons. The Committee has adopted his suggestion that irons might be hired to tenants on the estate

and prepayment-meter consumers in other districts if the hire charge therefor was effected by the Corporation retaining the ½d. per kWh of current consumed which is at present returned to consumers each time a meter is emptied, as a result of meters being set to supply current at the rate of 5d. per kWh. The irons are to remain the property of the Corporation.

Street Lighting.—The Electricity Committee is to provide electric lighting on the tramway route from the New Quay to the Grand Parade at a cost of £900.

Worksop.—Electricity Festival.—Celebrations to advertise the town as suitable for new industries are being held this week. There is a comprehensive electricity exhibition at the Town Hall, together with plentiful illuminations. The formal inauguration took place on Monday evening and among the guests were Sir William Ray (executive chairman, E.D.A.), Mr. A. N. East (engineering inspector to the Electricity Commissioners), Capt. A. W. Brown (North Midlands Area Officer of the E.D.A.) and Mrs. Brown, Mr. C. W. Sully (director, E.L.M.A.), Mr. E. Morgan (general manager, Sheffield Corporation Electricity Department), Mr. W. J. Jones (E.L.M.A.), Mr. T. Roles (electrical engineer and manager, Bradford), Mr. W. H. Duffet (engineer and general manager, Rotherham Electricity Department), Mr. D. H. Davies (borough electrical engineer, Sheffield), Mr. A. Bishop (borough electrical engineer, Buxton) and Mrs. Bishop, and Mr. E. H. Hewlett (borough electrical engineer, Mansfield). This year's illuminations are on the wooded slopes of Sparken Hill, leading to the Dukeries and Sherwood Forest. At the foot of the hill there are two illuminated set pieces and on the right and left fairy lamps are hung in the trees. The woods on either side of the road and the entrance to Welbeck Abbey are floodlighted every Wednesday, Friday, Saturday and Sunday until June 2nd.

Worthing.—The Education Committee has decided to have new schools in Lyndhurst Road heated by electricity.

Traction

Algeria.—A "Tube" Railway.—The Algiers Municipal Council has adopted a report in favour of the construction of an underground railway beneath the city. It is estimated that the cost will be approximately £1,000,000, and an additional £130,000 will be required for rolling stock.—*Reuter.*

Bradford.—Buses Replace Trams.—The Tramways Committee has approved a proposal to substitute motor buses for trams on the Heaton route.

Glasgow.—Reconditioned Tramcars.—The Transport Committee has placed contracts amounting to over £36,000 for the reconditioning of tramcars. In connection with a scheme costing £165,750, 125 semi-high-speed cars are to be equipped with high-speed motors, the equipment in the semi-high-speed cars being transferred to low-speed cars.

Holland.—Railway Electrification.—We learn that the line between Rotterdam and the Hook of Holland, a distance of 17½ miles, is to be electrified. The electrified extension between Rotterdam and Dordrecht (12½ miles) is to be opened on May 16th.

Japan.—Underground Railway Proposal.—Our Yokohama correspondent reports that the Hanshin Electric Railway has been granted a charter for the construction of an underground railway in Kobe at a cost of ten million yen. The track gauge will be 1.435 metres and the length 3 km.

Nottingham.—New Tower Wagon.—The Corporation Transport Department, which runs a number of trolley-buses and tramway services, has recently put into service an interesting new type of tower wagon for maintenance work on overhead lines. The chassis used is that of an old municipal double-deck bus, on which has been mounted a special tower superstructure, bodywork, &c., by the Eagle Engineering Co., Ltd., Warwick. The tower consists of a fixed cage with two telescopic sections which can be extended to a total height of 25 ft.

Southern Railway.—Electrification.—The passenger service of electric trains to St. Mary Cray will begin on May 1st.

South Africa.—Railway Electrification.—The electrification of the line between Daimana and Harrismith is expected to be completed within the next three months, which is much sooner than was originally anticipated. This is due to an improved method of distributing the cables, by which four miles per day can be laid, compared with half a mile per day previously. Further electrification of the Natal main line, from Glencoe to Newcastle, will be undertaken as soon as the railway estimates are passed. This work may be extended to take in Volksrust, and, later, electrification from Volksrust to Johannesburg is contemplated.

Traffic Signals.—The Swindon Highways Committee proposes to erect vehicle-actuated traffic signals at two road junctions.

Communications

Bulgaria.—New Radio Station.—A *Reuter* message from Sofia says that the Bulgarian Government has decided to build a 50 kW broadcasting station at Sofia. A credit of 40,000,000 levas (about £95,000) from Post Office savings has been arranged, and it is hoped that the new station will be completed within the next twelve months. This decision follows the opening three weeks ago of a 5 kW station erected by private enterprise. The demand for a State subvention for this station drew the attention of the Cabinet to the whole question, and it was decided that a powerful station would be invaluable to Bulgaria as a means of propaganda. When the new station is opened the existing station will be moved to Plovdiv or Varna.

Iceland.—New Radio Plant.—Radio-telephone communication between all parts of Iceland and Great Britain is among the services to be provided by new Marconi short-wave transmitting and receiving stations which have just been ordered by the Iceland Posts and Telegraphs Administration for erection near Reykjavik. In addition, the new stations are to be used for short-wave broadcasting and for transmitting weather bulletins by radio-telegraphy at regular intervals, to supplement the present cable meteorological services to Great Britain, France, Germany, Holland, Norway, Sweden, and the United States. All the equipment for the stations is being designed and constructed at Chelmsford. The transmitter will be of entirely new design, with a novel system of low-power keying and tone modulation. The telephone equipment will include "privacy" apparatus, and the Marconi Company is also supplying terminal equipment for connecting the radio channel with the land-line telephone system throughout the island. Directional aerials of the series phase type are to be employed, primarily oriented for the European capitals, for which the various services of the stations are intended.

Manchuria. — Telephone Development. — An extensive scheme for extending the present telephone service is to be undertaken by the Manchuria Telegraph and Telephone Co. Among other improvements, a new telephone exchange, costing 600,000 yen (£35,000 at current rates), is to be built at Dairen. A thousand new telephones are to be installed in the Mukden district, and a new exchange to handle another 1,000 is to be built at Changchun, the capital.—*Reuter* (Dairen).

New Zealand.—New Broadcasting Station Contract.—For the new broadcasting station to be built at Auckland by the New Zealand Broadcasting Board, a contract has been placed with Amalgamated Wireless (Australasia), Ltd. The transmitter is to have a power of 10 kW in the aerial.

Radio-telegraphy.—Wireless telegraph communication has recently been established between New Zealand and the Island of Tahiti.

South America.—Telephone Developments.—According to a statement made by Mr. H. T. Holm, director of the Swedish L.M. Ericsson Company, preliminary negotiations are proceeding in New York between the company on behalf of its Mexican telephone subsidiary, and the International Telegraph and Telephone Company, with a view to bringing about an improvement in the conditions in the telephone market in Mexico and in Argentina. The American company also has subsidiary telephone undertakings in each of these two countries.

The New Post Office Board

Left to right: Lt.-Col. F. M. Westbury, Postmaster-Surveyor, Glasgow; Col. A. G. Lee, Engineer-in-Chief; Mr. H. Sambrook; Mr. L. Simon; Sir Frederick Williamson; Mr. T. R. Gardiner; Col. T. M. Banks, Director-General; Sir Kingsley Wood, Postmaster-General; Sir Ernest Bennett, Assistant Postmaster-General; Sir Stephen Tallants; and Sir Henry Bunbury

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Argentina.—Buenos Aires.—May 22nd. National Sanitation Works Department. Two hydro-electric sets, two electric centrifugal pumping sets, and five deep-well pumping sets. (A.Y. 12320.)*

May 11th. Argentine State Oilfields. Material for electric lighting installations. (A.Y. 12330.)*

Australia.—Brisbane.—June 8th. City Council. Traction sub-station equipment. (A.Y. 12283.)*

Melbourne.—Posts and Telegraphs Department. June 26th. Battery and magneto P.B.X. cordless type, table pattern telephone switchboards. (A.Y. 12317.)*

June 5th. V.i.r. lead-covered cable. (A.Y. 12325.)*

June 18th. City Council. Electrically driven centrifugal pump. (G.Y. 13707.)*

Cardiff.—May 15th. Corporation. Electrical equipment for extensions of City Isolation Hospital. Specification from Medical Officer of Health, City Hall.

May 14th. Rural District Council. E.h.p. and l.p. overhead lines and pole mounting switchgear and transformers. (See this issue.)

Castle Donington.—May 4th. Rural District Council. Reconditioning of sewage disposal works, including electrically driven centrifugal pumping plant. Specifications from S. C. Eagles, 71, Temple Row, Birmingham (deposit of cheque for £2 2s., payable to H. M. Clifford).

Cheadle and Gatley.—May 14th. U.D.C. Switchgear and one 350-kVA transformer. (See this issue.)

Cleethorpes.—April 30th. U.D.C. One 250-kW transformer, e.h.p. switchgear and cable. (April 13th.)

May 7th. Electricity Department. 660-V cables. (See this issue.)

Croydon.—May 4th. Corporation. Cables from June 1st, 1934, to March 31st, 1935. (See this issue.)

Dagenham.—April 27th. U.D.C. Electrical wiring, fittings, &c., at the new branch library. (April 6th.)

Dartford.—April 27th. Corporation. Cable. (April 13th.)

Edinburgh.—May 1st. Governors of Heriot-Watt College. Electric lighting and power installations at extensions. Schedules from E. J. MacRae, city architect; tenders to A. M. B. Cullen, clerk to the governors, Heriot-Watt College, Chambers Street.

Egypt.—Cairo.—May 5th. Ministry of the Interior. Supply of plant for the electrification of the Fikrieh waterworks. (A.Y. 12340.)*

May 6th. Supply of equipment in connection with the proposed electrification of the Maufalout waterworks. (A.Y. 12341.)*

Galashiels.—May 4th.—Town Council. Various works, including electrical, in connection with the Larchbank Street housing scheme. Schedules from J. and J. Hall, architects; tenders to J. B. Lumsden, Town Clerk.

Glasgow.—May 7th. Electricity Department. Supplies as required for one year of cables, meters and cable tiles. (April 20th.)

Hull.—May 15th. Electricity Department. One 25,000-kW turbo-alternator with auxiliaries. (April 20th.)

India.—Travancore.—June 4th. Government Electricity Department. Turbines, generators, switchgear, transformers, &c. (February 9th.) Date extended from May 7th.

July 9th. 66, 33 and 11-kV circuit lines. (April 20th.)

Simla.—May 10th. Indian Stores Department. Five oil-cooled power transformers. (A.Y. 12305.)*

May 14th. Alkaline storage batteries for train lighting. (A.Y. 12332.)*

Kingston-on-Thames.—May 10th. Electricity Department. Stores for period ending March 31st, 1935. (See this issue.)

London.—H.M. Office of Works. May 8th. Supply of mechanical and electrical engineering labour in the Newcastle-on-Tyne, Leeds and Southampton districts for three years. (April 13th.)

St. Marylebone.—May 7th. Borough Council. Underground cables for one year. (See this issue.)

Stepney.—June 4th. Supply for one year of meters, demand indicators, and combined meters and demand indicators, conduits, troughs and covers. (See this issue.)

Middlesbrough.—Town Council. Electric lighting of the Archibald and Linthorpe council schools. Particulars from Stanley Moffett, Director of Education.

May 14th. Electricity Department. Twelve months' supply of cables and meters. (See this issue.)

New Mills.—May 3rd. Electricity Department. Underground e.h.p. and l.p. cables, together with electrical equipment. (April 20th.)

Newport (Mon).—May 19th. Electricity Department. 6,000-V, 3-phase switchgear. (See this issue.)

New Zealand.—Wellington.—Posts and Telegraphs Department. May 7th. Thirty-seven moving-coil milliammeters and one voltmeter. (A.Y. 172272.)*

Public Works Department. May 29th. One 33-kV oil-immersed circuit-breaker. (A.Y. 12276.)* Three single-phase potential transformers. (A.Y. 12274.)*

June 26th. Battery-charging equipment. (A.Y. 12273.)*

May 8th. 6-V secondary batteries. (A.Y. 12244.)*

May 22nd. Battery-charging equipment. (A.Y. 12249.)*

June 5th. 50-V storage battery and charging equipment. (A.Y. 12245.)*

May 8th. Three 63.500/63.5-V oil-immersed self-cooled transformers. (A.Y. 12303.)*

Norwich.—May 3rd. Corporation. Provision and installation of electrically driven centrifugal pumping plant. Specifications from Engineer and Manager, Waterworks Offices, Surrey Street (£2 2s.).

Ormiston.—April 30th. East Lothian County Council. Various works, including electrical, at new schoolhouse. Schedules from County Architect, Property and Works Department, Haddington; tenders to G. Cruickshank, county clerk, County Buildings, Haddington.

Pontefract.—May 7th. West Riding Public Assistance Committee. Electric lighting installation at the County Institution. West Riding Architect, County Hall, Wakefield; tenders to Sir J. Charles McGrath, clerk to county council, County Hall, Wakefield.

Portland.—May 26th. U.D.C. Turbine borehole pump and a.c. motors, Diesel engine and alternator, and transformer and switchgear. (See this issue.)

South Africa.—Johannesburg.—May 11th. Municipality. 600-300-A, 6,600-V isolating links. (A.Y. 12329.)*

King Williams Town.—May 12th. Town Council. Electrical material. (A.Y. 12335.)*

Oudtshoorn.—Municipality. May 16th. Steam raising and electrical plant. (G.Y. 13721.)*

South Shields.—May 2nd. Electricity Supply Department. One 1,000-kW rotary convertor complete with transformer and switchgear. (April 13th.)

Taunton.—May 11th. Electricity Department. One 3,750-kW turbo-alternator and one 25,000-lb. water tube boiler. (April 13th.)

Weymouth.—April 30th. Electricity Department. E.h.p. and l.p. overhead and underground mains. (April 20th.)

* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Chester.—Watch Committee. Recommended. Traffic signals at Old Dee Bridge (£787).—Automatic Electric Co., Ltd.

Denny.—Town Council. Accepted. Cables for extension of the borough services.—E. Masson.

Fifeshire.—Finance Committee. Accepted. Electrical installation at the Torryburn and Newmills housing scheme (£194).—J. Scott & Co.

Formby.—Urban District Council. Accepted. Works in connection with the bulk supply change-over (£4,303).—W. T. Henley's Telegraph Works Co., Ltd.

Government Contracts.—The following contracts were placed by the various Government departments during March:—

Admiralty (Contracts and Purchase Department).

Rubber insulated cable.—Enfield Cable Works; W. T. Glover & Co.; Hoopers Teleg. & I. R. Works; Siemens Electric Lamps.

Motor for welding generators.—Met.-Vick. Elecl. Co.

Generating sets and equipment.—Aster (1932), Ltd.

Motor generators and boosters.—Haslam & Newton; W. Mackie & Co.; Mawdsleys.

Mountings and holders for w/t valves.—Gambrell Bros.; G.E.C.; R. I., Ltd.; H. W. Sullivan, Ltd.; Veritys; H. E. Williams & Son.

Electrically driven fresh water pumps.—Worthington-Simpson.

Reflectors for signalling projectors.—C. A. Parsons & Co.; Chance Bros.

Transformers.—English Electric Co.; Foster Engg. Co.; Johnson & Phillips; B.T.H.; Ferranti, Ltd.

W/t valves.—G.E.C.; Ediswan; Mullard Radio Valve Co.

Electrically driven winches.—Stothert & Pitt; Sunderland Forge & Engg. Co.

War Office.

Electric light, &c., fittings.—G.E.C.; Revo Electric Co.; J. H. Tucker.

Generating sets and spares.—R. A. Lister & Co.

Electric lamps.—B.T.H.; Ediswan; Stella Lamp Co.; G.E.C.

Air Ministry.

Accumulators.—Oldham & Son.

Batteries.—Britannia Batteries.

Frequency measuring equipment.—Marconi's.

Signalling lamps.—Aldis Bros.

Motor generators.—Rotax, Ltd.

W/t receivers.—Marconi's.

Switch boxes.—Phœnix Telephone & Electric Works.

Transmitters.—Marconi's.

Mobile w/t stations.—Marconi's.

Post Office.

Telephonic apparatus.—Automatic Electric Co.; Ericsson Telephones; G.E.C.; Hall Telephone Accessories; Plessey Co.; Siemens Bros.; Standard Telephones; Telephone Mfg. Co.

Testing and protective apparatus.—Ernest Turner Electl. Inst.; Everett, Edgcumbe.

Leclanché boxes, batteries.—Siemens Bros.

Cable.—Connollys; G.E.C.; Henley's; Siemens Bros.; Standard Telephones; United Telephone Cables.

Loading coils.—Siemens Bros.; Standard Telephones.

Telephone cords.—Reliance Elecl. Wire.

Dynamotors.—Dynamo & Motor Repairs.

Electric lighting fittings.—Hailwood & Ackroyd.

Copper wire.—B. I. Cables.

Flameproof wire.—L. P. S. Elecl. Co.; Reliance Elecl. Wire.

Cable testing and balancing and the supply, installation and jointing of loading coil cases.—Nantwich-Warrington-Liverpool cables; Standard Telephones.

Cabling, loading coils and terminations.—Leeds-Harrogate

No. 2 cabling: Standard Telephones. Leicester-Nuneaton cabling; Coventry-Leamington-Warwick No. 2 cabling: United Telephone Cables.

Electric lifts, Newcastle-on-Tyne railway station sorting office.—W. Wadsworth & Sons.

Telephone exchange equipment.—Stratford-on-Avon (new auto exchange); Leeds (city police) (private exchange equipment); Plymouth.—Automatic Electric Co. Sub-contractors: Alton Battery Co. for batteries; Electric Construction Co. for generators and ringing machines. Bristol auto exchange area; London Wall; Monument (London).—Automatic Electric Co. Dundee: G.E.C. Hull trunk telephone exchange: G.E.C. Birmingham; Waterloo (London); London trunk exchange; Southall (London).—Standard Telephones. Mitcham (London); Belfast Central; Malom; Belfast North; Belfast East; Fortwilliam.—Siemens Bros. Sub-contractors: Chloride Elecl. Storage Co. for batteries; Electric Construction Co. for generator and ringing machines.

Submarine cable.—Dundee-Newport.—Siemens Bros.

CROWN AGENTS FOR THE COLONIES.

E.h.p. line materials.—Callender's.

Spares for "Lux" cells.—Chloride Elecl. Storage Co.

Sub-station switchgear.—Ferguson, Pailin.

Telephone cables, &c.—B. I. Cables.

Train lighting equipment.—J. Stone & Co.

Transformer and switchgear equipments (combined).—Ferguson, Pailin.

Wireless apparatus.—Marconi's.

Glasgow.—Corporation. Accepted. Control switches for Govan car sheds.—Metropolitan Vickers Electrical Co., Ltd. Electrical work at Thomson Street School (£237).—Kennedy, Stark & Co. Additional economisers at Dalmarnock generating station.—Green & Co., Ltd.

Kettering.—Electricity Committee. Recommended. Cable for twelve months.—Union Cable Co., Ltd. One 350-kVA and one 250-kVA transformer.—Brush Electrical Engineering Co., Ltd.

London.—ST. PANCRAS.—Contracts and Stores Committee. Recommended. H.p. switchgear for Tavistock Place (£795).—A. Reyrolle & Co., Ltd. H.p. switchboards for Tavistock Place and Highgate (£614).—English Electric Co., Ltd. Cable (£663).—Standard Telephones & Cables, Ltd. 4,000 meters.—Chamberlain & Hookham, Ltd.

ST MARYLEBONE.—L.C.C. Accepted. Electrical installations on the Lilestone estate (£241).—Electrical Installations, Ltd.

FULHAM.—Electricity Committee. Recommended. Main transformers (£34,510).—Metropolitan-Vickers Electrical Co., Ltd.

BATTERSEA.—Electricity Committee. Recommended. Supplies for eleven months. Electricity meters.—Chamberlain & Hookham, Ltd.; Ferranti, Ltd. Cables, cut-outs and service joint boxes.—Callender's Cable and Construction Co., Ltd.

Metropolitan Water Board. Accepted. Three portable generating sets (£4,170).—W. H. Allen, Sons & Co., Ltd. One vertical spindle electrically driven pump (£1,314).—Harland Engineering Co., Ltd. Two sets of electrically driven centrifugal pumps (£1,730).—Gwynnes Pumps, Ltd.

ISLINGTON.—Highways Committee. Recommended. Vehicle actuated traffic signals (£1,940).—Automatic Electric Co., Ltd.

Mansfield.—Highways Committee. Accepted. Two electric vehicles.—General Vehicle Co., Ltd.

Southend-on-Sea and East Ham.—Town Councils. Accepted. Electrical work at the new mental hospital at Runwell.—Bell Bros. & Co. (London), Ltd.

Swansea.—Electricity Committee. Accepted. Cooker control switches.—Revo Electric Co., Ltd.

Tynemouth.—Electricity Committee. Accepted. Switchgear (£1,262).—A. Reyrolle & Co., Ltd. Cables for three years (£2,096).—Macintosh Cable Co., Ltd.

Weymouth.—Town Council. Accepted. Adjustments in connection with the change-over at Westham (£910).—V H. Bennett & Co.

Forthcoming Events

Electrical Industries Benevolent Association.—Friday, April 27th. Café Royal, W.1. 12.30 p.m. Annual meeting.

Farmers' Club.—Monday, April 30th. Royal United Service Institution, London. 4 p.m. "The Application of Electricity to Agriculture." Sir William Ray.

Royal Society of Arts.—Monday, April 30th. John Street, W.C.2. 8 p.m. "Gyroscopes." Prof. J. G. Gray. Wednesday, May 2nd. 8 p.m. "Trichromatic Reproduction in Television." Mr. J. C. Wilson.

Institution of Electrical Engineers.—Thursday, May 3rd. Institution, London. 6 p.m. "Modern Practice in Germany and other parts of the European Continent with regard to Supervisory Control Systems as applied to Large Interconnected Supply Areas." Dr. M. Schleicher. (*London Students' Section*).—Friday, April 27th. Institution, London. 6.15 p.m. "Train Lighting." Mr. C. T. Gould. (*Wireless Section*).—Wednesday, May 2nd. Institution, London. 6 p.m. "An Examination of the Causes and Nature of the Interference to which the Wireless Communications of the Mercantile Marine are Subjected." Comdr. J. A. Slee. (*Meter and Instrument Section*).—Friday, May 4th. Institution, London. 7 p.m. "An Experimental Sequel to Faraday's Work of 1831." Prof. W. Cramp. Saturday, May 5th. Summer visit to Birmingham.

Institution of Mechanical Engineers.—Friday, May 4th. Storey's Gate, London. 7 p.m. Informal meeting. "Photo-Electric Cells and their Application." Mr. R. C. Walker.

Makers' Names Wanted

M.C. two-prong caliper bulb tester.

G.L.B. Liverpool cable.

Notes

The Radio Interference Committee

The Institution of Electrical Engineers' Committee on Radio Interference announces that it finds it desirable to establish, in the first place, practical methods and instruments for appraising the interference and the apparatus causing it. With this end in view it has been found essential to agree some standard of interference which, on the one hand, will represent substantial immunity for a well-designed radio set, and, on the other hand, is demonstrated as being of practical application to electrical appliances which emit interference, and to radio sets which are subject to such interference. The attention of the Committee is further being actively directed along two channels, namely, studies of methods and devices, and their effectiveness, which are within the power of the radio listener to apply, for ameliorating the effects of interference; and of methods and devices for suppressing the emission of interference from electrical apparatus. The interests represented on the Committee are co-operating actively to resolve all these questions as a necessary preliminary to making recommendations.

I.E.E. Students' Summer Tours

Provided enough applications are received, the London Students' Section of the Institution of Electrical Engineers is to tour the Ruhr district and northern Germany this summer. The party will leave London on July 28th and return on August 8th, various works of engineering interest being visited en route. The cost of the tour will be £11, and applications should be made to Mr. T. S. Smith, 51, Exeter Road, Welling, Kent.

The students' summer outing will consist of a tour of the Southern Railway's electrification scheme on June 2nd. Luncheon will be served on the train to Brighton and there will be a reunion at Three Bridges. Tickets (10s. each) are obtainable from Mr. N. Rice, 32, Elsie Rd., Dulwich, S.E.22.

New Sub-standard Cinema Outfit

Normal talkie cinema equipment used for theatre work employs a standard film 35 mm. in width, while most portable outfits utilise a sub-standard film 16 mm. wide. The new self-contained portable apparatus of Pathé Pictures, Ltd., which was demonstrated in London last week, introduces a new sub-standard film width of 17.5 mm., just half the standard frame width and height. The additional 1.5 mm. allows the sound track on the film to be of the full standard size, thus materially improving the reproduction of speech and sound by a sub-standard machine. The new film has only one row of driving perforations and one perforation per frame; the speed is the standard twenty-four frames per second, which represents exactly half the linear speed of standard film.

The projector is exceptional in being built almost entirely of castings, making it very sturdy. The same lamp is employed for both projecting the pictures and illuminating the sound track, while the total current of the projector lamp, driving motor, and amplifier is only 2.5 A, so that the outfit can be run off any a.c. mains plug or lamp socket. The outfit operates unusually quietly, is easy to control, and the films are non-inflammable. The machine is conveniently encased for transport, weighing 35 lb. and measuring 20 in. in length, 9 in. in width, and 18 in. in height. The outfit costs £60.

I.E.E. Western Centre Meeting

The week-end summer meeting of the Western Centre of the Institution of Electrical Engineers is to be held at the Sedbury Park Hotel, near Chepstow, from May 11th to 14th. On the Friday evening the annual general business meeting will be held, and will be followed by dinner and a dance at the invitation of Edison Swan Cables, Ltd. On the Saturday there is to be a treasure hunt (private cars), visits to places of interest, and the Western Centre dinner and dance in the evening, while on the Sunday a golf competition for the past-president's cup will be played.

Pipe Thawing Equipment

The practice of heating frozen pipes by passing an electric current through them is not new, but last winter's severity brought the advantages of this thawing method into prominence in the United States, particularly when the frozen pipes were underground or otherwise inaccessible.

Arc-welding generators, because of their special electrical characteristics, are extremely well suited to the work. High currents are required at relatively low voltage, and load resistance (length of pipe in the circuit) varies widely from job to job. For instance, it has been the experience of some users that 250 A will thaw a ¾-inch pipe 300 feet long in from 3 to 10 minutes, and again that a 3-inch pipe 100 feet long will take nearly an hour to thaw with current in the neighbourhood of 500 A. Voltages involved vary usually between 10 and 50 V.

Appointments Vacant

Installation and apparatus inspector for the Colwyn Bay Urban District Council Electricity Department.

Lecturer in electrical engineering for the Wigan and District Mining and Technical College.

Personal engineering assistant for the Hull Electricity Department.

Special development assistants and canvassers for the London & Home Counties Joint Electricity Authority.

(See our classified advertisements.)

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

Mr. J. G. Kellie, M.Eng., A.M.I.E.E., whose appointment as chief assistant electrical engineer to the Ealing Corporation Electricity Department was announced in our last issue, received his technical education at the University of Liverpool and served his apprenticeship with Messrs. Cammell, Laird & Co., Ltd., Birkenhead. He was on the engineering staff of the Yorkshire Electric Power Co. for four years, and gained considerable experience in electrical distribution and transmission over large areas. For the past six years he has been district engineer with the Norwich Corporation Electricity Department, in charge of the southern area of supply, covering approximately 230 sq. miles, and during this period he has been responsible for the electrical development of this area, which now includes fifty villages and townships, with a district office and associated showrooms at Wymondham. Mr. Kellie takes up his new duties on June 4th.

[*Swain*

Mr. J. G. Kellie

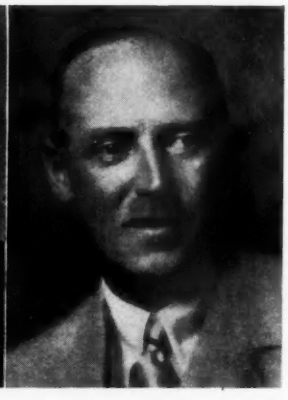
Mr. W. J. A. Murray, son of Mr. W. Murray, burgh electrical engineer of Stirling, has been appointed charge engineer at the Loch Tummel hydro-electric power station. He has been on the staff of the Stirling electricity undertaking.

Mr. J. C. Lane has been appointed to succeed the late Mr. W. H. Alabaster as city electrical engineer of Melbourne. Mr. Lane, who has been in the service of the Melbourne City Council for twenty-five years, was appointed deputy city electrical engineer in 1920. His salary will be at the rate of £1,500 a year.

Mr. J. A. O'Brien, electrical engineer to the Redcar Town Council, has had his salary increased by £100 per annum as an appreciation of his services. Since 1927 the consumption of electricity in Redcar under his supervision has increased by over 400 per cent.

Lord Herbert Scott, C.M.G., D.S.O., D.L., who was recently elected president of the Federation of British Industries, filled the office of president of the London Chamber of Commerce from 1928 until 1931. In 1931 he was vice-president of the Association of British Chambers of Commerce. He is a director of Rolls-Royce, Ltd., the Cellulose Acetate Silk Co., Ltd., the Tilbury Contracting & Dredging Co., Ltd., and United Glass Bottle Manufacturers, Ltd.

Mr. M. B. U. Dewar, a new vice-president of the F.B.I., is chairman of British Timken, Ltd. He sailed for the United States on April 21st to study industrial conditions there in the light of the changes brought about by the depression and the subsequent N.R.A. drive to recover prosperity. His last visit was in 1931, just before the severest effects of the world economic troubles were felt in the States. In 1928 Mr. Dewar went to Canada and the United States as a member of the Ministry of Labour delegation to study industrial conditions, particularly the relations between employers and employed.



[*Elliott & Fry*

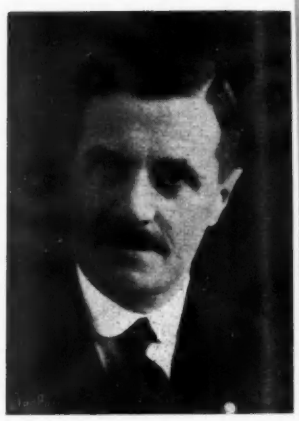
Lord Herbert Scott **Mr. M. B. U. Dewar**

As reported in our issue of February 2nd, **Mr. Howie,** electrical engineer and manager of the Walsall electricity undertaking, is retiring shortly, and the question of advertising for his successor was discussed at a recent meeting of the Corporation. The Electricity Committee recommended that a general manager be advertised for at a salary of £750 per annum, rising by £25 per annum to £900, but an amendment was carried by thirteen votes to ten that the position should be advertised at a commencing salary of £600, rising by £25 per annum to £750. Councillor D. Cartwright, in moving the amendment, said it was time to practise economy and the Council could get the right man at this salary.

Mr. L. D. Tong, who has been assistant sales engineer with the Foster Engineering Co., Ltd., at its Newcastle branch, for the past four years, has recently joined the staff of the General Electric Co., Ltd., Osram Lamp Department, at the head office, Kingsway, W.C.

Miss I. M. Parkes-Gibbon, of Clydach, has been appointed lady cooker demonstrator with the Swansea Electricity Department. Miss Parkes-Gibbon has had nine months' service as domestic science teacher under the Birmingham Education Committee, and also experience of electrical appliances at the Battersea Polytechnic, together with considerable experience in lecturing and public speaking.

Mr. J. L. Lovell has joined the Electric Construction Co., Ltd., as representative in the area comprising the Bristol district, including the counties of Gloucester and Hereford and parts of Wiltshire and Somerset. He has recently severed a long-standing connection with the A.E.I. group; he was previously in the Trafford Park works and sales offices in Manchester and Leeds of the British Westinghouse Co. (now Metropolitan-Vickers Electrical Co., Ltd.). In 1925 he was appointed district manager of Metro-Vick Supplies in Bristol, and when the businesses of Metropolitan-Vickers, B.T.-H., and Ediswan were merged in 1930 he took over the combined office operating under the Ediswan name. He has held various offices, including that of chairman of the local E.L.M.A. and B.V.A. Committees, of the Bristol Circle of E.D.A., and of the Bristol Electric Club, of which he was one of the founders.



[*Jerome*

Mr. J. L. Lovell

Mr. J. D. MacKenzie, 247, St. Vincent Street, Glasgow, is relinquishing the Scottish representation of Messrs. Berkeley & Young, Ltd., Birmingham, at the end of the current month. Mr. MacKenzie will continue to look after the interests of Messrs. W. Lucy & Co., Ltd., and J. G. Statter & Co., Ltd., whom he has represented in Scotland for many years.

Mr. A. E. Flaskett, managing director of Enfield Cable Works (Australasia), Ltd., of Melbourne, has arrived in London, accompanied by Mrs. Flaskett.

Mr. J. A. Cockburn, of Messrs. W. T. Henley's Telegraph Works Co., Ltd., has arrived in Brisbane to supervise the laying of a 33,000-V underground cable for the City Electric Light Co., Ltd. Mr. Cockburn is a native of Adelaide and has not been in Australia for eight years. He was engaged in India on the Great Indian Peninsula Railway electrification scheme, while recently he has been connected with contracts in the South-East England Area of the Central Electricity Board.

Mr. Sam Mavor, of Messrs. Mavor & Coulson, Ltd., has been appointed by the Board of Trade to the Standing Committee of the Council for Art and Industry, which will deal with questions affecting the relations between art and industry in Scotland.

Mr. George Roxburgh, M.I.Mech.E., has joined Messrs. Worthington-Simpson, Ltd., in the capacity of manager of the Condensing Department. Mr. Roxburgh will be at the London office, Queen's House, Kingsway, London, W.C.2.

Mr. E. Graham Ross, A.M.I.E.E., the author of the article entitled "Checking Production" on page 589 of this issue, was educated at Hamilton Academy and the Royal Technical College, Glasgow, and served his apprenticeship with the Macfarlane Engineering Co., Ltd., Glasgow, with whom

he afterwards held various positions. After service in the Royal Engineers he joined the Metropolitan-Vickers Electrical Co., Ltd., on development work, and then returned to Glasgow as manager of domestic appliances in the Scottish area for the General Electric Co., Ltd. Subsequently he became leading draughtsman and designer with Walter McGee and Sons, Paisley. He is now chief electrical engineer with Messrs. Heenan & Froude, Ltd., Worcester, with whom he has been for the last five years or so. He is responsible for all electrical work in the works, the design and construction of special machines and for advising on the application of electrical plant to a number of industries.

Mr. W. E. Gooday, chief of the Industrial Technical Department of the Vacuum Oil Co., has been elected to the Council of the Institution of Petroleum Technologists.

Lt.-Col. F. A. Cortez Leigh, M.I.E.E., is retiring at the end of June from the position of electrical engineer to the L.M.S. Railway. He will be succeeded by **Mr. C. E. Fairburn.**

Mr. E. W. Walker, for seven years Birmingham branch manager for Messrs. Crompton Parkinson, Ltd., and until recently sales organiser for their associated company, Derby Cables, Ltd., has resigned his position with that company. He has commenced business on his own account as manufacturers' agent at Service House, 1, Fleet Street, Birmingham (telephone: Central 1084), and has been appointed Birmingham district agent for the Electric Construction Co., Ltd., Wolverhampton.

Mr. E. W. Walker

Mr. R. H. Holmes, of Southend-on-Sea, has been appointed electrical engineer and manager at Sleaford (Lincs) at a commencing salary of £295 per annum.

Following a dispute with the Middlesbrough Transport Committee, **Mr. H. G. Jeken,** transport manager, has offered his resignation, and the Committee has accepted it.

The Parliamentary and General Purposes Committee of the St. Pancras Borough Council has considered the filling of appointments of superintendent of sub-stations and mains assistant rendered vacant by the deaths of Mr. A. H. J. Chalmers and Mr. A. F. Walters, respectively, and has recommended that **Mr. T. C. Munford,** mains superintendent, be appointed mains superintendent in charge of sub-stations, and **Mr. E. A. Phillips,** junior mains assistant, be promoted to be first mains assistant. The consideration of the filling of the position of sub-station superintendent or technical assistant is deferred to a later date, and it is proposed to advertise for a second mains assistant as well as a junior mains assistant.

Mr. F. T. J. Firminger, D.Sc., managing director of Lighting Research, Ltd., until his illness, is now practising as a lighting consultant at 84a, Highbury New Park, N.5.

Mr. H. Horwood, A.M.I.E.E., who for eleven years has been associated with the A.E.G., has resigned his position as manager of the Meter Department (England), and has joined Measurement, Ltd.

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Mr. H. Horwood

The Liverpool Corporation Electricity Committee has recommended that the salary of **Mr. P. J. Robinson,** the city electrical engineer, be increased from £1,800 to £3,250.

Mr. Howard Foulds, the secretary of Callender's Cable & Construction Co., Ltd., has been elected the chairman of the Caterham Urban District Council.

Mr. H. C. Rogers, for many years with the Stearn Electric Co., has joined the Z Electric Lamp & Supplies Co., Ltd., to act as its representative in the Southern Counties.

Mr. L. J. Gooch, A.M.I.E.E., sales manager of Messrs. Marryat & Scott, Ltd., was recently married to Miss G. E. Grimwood at Ruislip Parish Church. He has been presented with an electric fire and an electric clock by the staff of Marryats.

Obituary

Mr. E. I. Everett.—Mr. Edgar I. Everett, one of the founders of Everett, Edgcumbe & Co., Ltd., died at Cooden, Sussex, on April 19th. Although on grounds of health he had not for some years taken an active part in the conduct of the business, his sudden death at the age of sixty-five came as a shock to a wide circle of friends. Mr. Everett was a member of various technical bodies, including the Institutions of Mechanical and Electrical Engineers, and had throughout his life devoted his energies and great mechanical ability to the measuring instrument branch of the electrical industry. In that branch he may be said to have been one of the pioneers. His interests were, however, very wide, and many will recall that it was almost entirely owing to his enthusiasm in flying that the London Aerodrome (Hendon) was founded, the famous flight of Paulhan from London to Manchester having started from the field which Mr. Everett had prepared for testing the aeroplane which he was building at the time. He started his career with the Cambridge Instrument Co., and after some time with Messrs. Nalders started business on his own account. In 1900, in collaboration with Col. K. Edgcumbe, Mr. Everett founded the business of Everett, Edgcumbe & Co., with works in Charterhouse Square, Clerkenwell, moving subsequently to Great Saffron Hill, and, later, to the present works at Hendon. In 1906 the business was formed into a limited company, with the collaboration of Mr. Patrick Hamilton.

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The late Mr. E. I. Everett

Mr. D. R. Merrett.—The death occurred on April 12th, at the age of forty-five, at the Cambridge Hospital, after a protracted and painful illness, following upon pneumonia, of Mr. David Roy Merrett, the deputy electrical engineer of the Aldershot Command. Mr. Merrett served an apprenticeship with the Great Western Railway at the Swindon Works, and later joined the Swindon Corporation electricity works, where he rose to the position of shift engineer. He then obtained an appointment on the staff of Messrs. Garrett & Co., of Leiston, and was entrusted by that firm with the installation of its specialised generating plant at the W.D. power station at Ratfyn in the Southern Command, where he ultimately became station engineer. He was later promoted to station superintendent at Tidworth power station, finally becoming deputy electrical engineer to the Southern Command. In 1931 he was appointed deputy electrical engineer to the Aldershot Command, where he had been in charge of extensive reconstruction and expansion work in connection with its power distribution. The interment took place at the Aldershot Town Cemetery.

Mr. T. Trimnell.—The death of Mr. Thomas Trimnell occurred last week at his home at Billericay, at the age of seventy-three years. Mr. Trimnell, whose offices were at 1, Lincoln's Inn Fields, was well known throughout the electrical industry and was esteemed for his personal charm. He was official solicitor to the B.E.A.M.A. for more than twenty years, and was also solicitor or honorary legal adviser to many other electrical associations. He came of sporting Yorkshire stock, and was himself a sportsman. Early promise of distinction in athletics, however, was cut short when he was a youth through a leg having to be amputated as the result of a railway accident. That he was thus maimed, or even lame, was known to only a few. He settled in practice in the City of London and established contact with the electrical industry at an early date, subsequently specialising in its various branches. Mr. Trimnell leaves a widow but no family.

The late Mr. T. Trimnell

Will.—Mr. Tom Westgarth, managing director of Messrs. Richardsons, Westgarth & Co., left £9,970 (net personalty £9,321).

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

C. H. Gibson, Ltd.—Private company. Registered April 18th. Capital, £600 in £1 shares. Objects: To carry on the business of electrical, mechanical, wireless, telephone, lighting, heating, motor and general engineers, &c. The provisional directors are: E. M. Hughes, 22, Broomfield Street, Caerphilly, Glam, and R. H. Morgan, Splot, St. Martin's Road, Caerphilly. Solicitors: R. R. Morgan & Son, Caerphilly.

Electricalities, Ltd.—Private company. Registered April 17th. Capital, £500 in 2s. shares. Objects: To carry on the business of mechanical and general engineers, manufacturers of, agents for and retailers of machinery of all kinds and electrical and wireless apparatus, &c. The subscribers are: B. J. Farrow, 5, Imperial Road, Redland, Bristol, and C. C. Atchison, Wall Tyning, Bitton, near Bristol. Registered office: 5, Imperial Road, Redland, Bristol, 6.

Battery Services (Kettering), Ltd.—Private company. Registered April 16th. Capital, £3,000 in £1 shares (1,500 ordinary and 1,500 6 per cent. cumulative preference). Objects: To acquire the business of radio and electrical engineers carried on by G. A. Harris and A. B. Crowsley, trading in co-partnership as "Battery Services" at Wood Street, Kettering. The life directors are: G. A. Harris, 123, Wood Street, Kettering, and A. B. Crowsley, 119, Rockingham Road, Kettering. Secretary: A. B. Crowsley. Registered office: 125, Wood Street, Kettering.

Diatatic Therapy Co., Ltd.—Private company. Registered April 19th. Capital, £200 in 1s. shares. Objects: To acquire the business of a manufacturer of electro-medical appliances now carried on by William E. Holder at Langham House, 308, Regent Street, W.1, and the registered trade mark and patents in connection with the "Diatatic" electric condensation machine and other appliances, &c. The directors are: W. E. Holder, 2, Gloucester Place, Brighton, medical electrician; and Jean S. Hills, 22, Lewisham Hill, S.E.13. Registered office: Langham House, 308, Regent Street, W.1.

F. W. Lechner & Co., Ltd.—Private company. Registered April 19th. Capital, £300 in £1 shares. Objects: To carry on the business of importers, repairers and manufacturers of and dealers in electrical components, mechanical and electrical machinery, wireless receiving and transmitting sets, &c. The permanent directors are: Friedrich W. Lechner, London Ceneral Y.M.C.A., Tottenham Court Road, W.C.; and G. C. Brauer (chairman and manager), 7, Sheldon Road, Cricklewood. Registered office: 61, Spencer Street, Clerkenwell, E.C.

International Electrical Supplies Co., Ltd.—Private company. Registered April 19th. Capital, £2,000 in £1 shares. Objects: To carry on the business of wholesale and retail factors of all electrical and wireless equipment and supplies, &c. The first directors are: M. Goldenberg, 80, Wargrave Road, Tottenham, N.15; and H. Cohen, 9, Leopold Street, E.3. Secretary: M. Goldenberg. Registered office: 464, Kingsland Road, E.8.

Aldwych Lamp Co., Ltd.—Private company. Registered April 18th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in electric lamps of all types, lighting equipment, radio goods, automobile equipment and accessories, &c. The directors are: S. Reitzmann, 26, Gloucester Place, W.2; S. G. Stafford, 6, Woodstock Avenue, Golders Green, N.W.11; and W. J. Woodhouse, Aldwych House, W.C.2. Registered office: Aldwych House, Aldwych, W.C.2.

Hendersons Wholesale Electrical and Radio, Ltd.—Private company. Registered April 19th. Capital, £15,000 in £1 shares. Objects: To carry on the business of wholesalers, factors and manufacturers of and dealers in electrical and wireless goods, &c. The permanent directors are: A. F. Phelp, Flat 2, 12, Lewes Crescent, Brighton; D. G. E. Barrie, "Avoca," Middleton Avenue, Hove; and E. V. Bowers, "Chapel Fields," Addlestone, Surrey. Solicitors: McBride & Co., 150, Southampton Row, W.C.1. Registered office: Electric House, Queen's Road, Brighton.

Kent Electrical Co., Ltd.—Private company. Registered April 20th. Capital, £500 in £1 shares. Objects: To carry on the business of contractors for the installation of electrical equipment, radiators, cookers, switches, refrigerators, &c. The directors are: Wm. James, "Accra," Hurst Road, Bexley, and six others. Secretary, Wm. P. Elliott. Registered office: 13, High Street, Welling, Kent.

A. J. Hewens & Sons, Ltd.—Private company. Registered April 19th. Capital, £12,000 in £1 shares. Objects: To carry on the business of manufacturers of and dealers in hardware of every description, engineers' stocks and sundries, dealers in wireless goods, electricians, manufacturers of and dealers in dynamos, motors, &c. The life managing directors are: Harold A. Hewens, 56, Belmont Hill, Lewisham, S.E.13, ironmonger, and C. J. Hewens, Kingscot, Kings Avenue, Bromley, Kent, electrical engineer. Registered office: 324/6, High Street, Lewisham, S.E.13.

Fullotone (1934), Ltd.—Private company. Registered April 20th in Edinburgh. Capital, £2,500 in £1 shares. Objects: To carry on the business of manufacturers' factors, sellers, importers and exporters of and dealers in wireless, telephone, television and telegraph apparatus, instruments, parts and accessories, motors, &c. The directors are: W. J. Parker, c/o Murray, 5, Melrose Street, Glasgow, C.4, radio manufacturer, A. C. McDougall, 28, Pensford Avenue, Kew Gardens, Surrey. Solicitor: A. E. Amour, 153, Queen Street, Glasgow.

Lawrence & Nicholas, Ltd.—Private company. Registered April 21st. Capital, £4,000 in £1 shares. Objects: To carry on the business of manufacturers, importers and exporters of, agents for and dealers in electrical, gas and oil lamps, quartz lamps, reflectors, bells, fires, stoves, cookers, switchboards, condensers, headphones, &c. M. Lawrence, 12, Arlington Avenue, Prestwich, Manchester, electrical factor, is the first director. Registered office: 208, Chapel Street, Salford, Lancs.

Returns of Electrical Companies

C. H. Mason & Co., Ltd.—J. W. Armstrong, 2, Collingwood Street, Newcastle-on-Tyne, was appointed receiver on April 4th, under powers contained in mortgage and mortgage debenture, dated August 9th, 1922.

Schall & Son, Ltd.—Satisfaction in full on March 29th of two debentures, both dated June 8th, 1927, and registered June 10th, 1927, securing £2,000 each.

Electrical & Radio Products (1931), Ltd.—I. Levy, 39, Cheapside, E.C.2, was appointed receiver and manager on April 3rd, under powers contained in "B" debentures, dated August 25th, 1931, and September 1st, 1931.

Electrolumination (Abadie Proces), Ltd.—Debenture dated April 5th, to secure £2,500 charged on the company's undertaking and property, present and future, including uncalled capital. Holders: Westminster Bank, Ltd.

Grampian Reproducers, Ltd.—The nominal capital has been increased by the addition of £2,750 beyond the registered capital of £3,000. The additional capital is divided into 1,000 ordinary shares of £1 and 3,500 deferred shares of 10s.

Richard Garrett Engineering Works, Ltd.—Debenture, dated March 27th, 1934, to secure £8,000, charged on the company's undertaking and property, present and future. Holders: Barclays Bank, Ltd.

Electriclocks and Radio, Ltd.—J. Green, 79, Mark Lane, E.C.3, ceased to act as receiver and manager on April 10th.

Electric Reduction Co., Ltd.—Capital, £50,000 in 16,200 preference and 33,800 ordinary shares of £1. Return dated November 10th, 1933. 16,200 preference and 28,800 ordinary shares taken up. £18,000 paid on 13,000 preference and 5,000 ordinary shares. £27,000 considered as paid on 3,200 preference and 23,800 ordinary shares. Mortgages and charges, £25,000.

James Bros. (Wiltshire), Ltd.—Capital, £6,000 in 2,000 6 per cent. first preference, 1,000 second preference and 3,000 ordinary shares of £1 each. Return dated November 3rd, 1933 (filed January 16th, 1934). 775 6 per cent. first preference, 1,000 second preference and 3,000 ordinary shares taken up. £1,775 paid. £3,000 considered as paid. Mortgages and charges, nil.

British Battery Co., Ltd.—Debenture dated March 24th, 1934, to secure £250, charged on the company's undertaking and property, present and future, including uncalled capital. Holder: A. N. Frisby, 33, The Avenue, Watford.

Victoria Electric Plant Co., Ltd.—Particulars filed of £600 debentures, authorised March 26th, 1934, charged on the company's undertaking and property, present and future, including uncalled capital, the whole amount being now issued.

City Notes

The English Electric Co., Ltd., held its annual meeting on April 24th, Mr. G. H. Nelson (chairman and managing director) presiding. In presenting the report and accounts (ELECTRICAL REVIEW, April 20th, p. 579), the chairman said that the debentures redeemed were £11,886 Willans & Robinson and £5,000 English Electric 5½ per cent. debentures. The fears which he expressed last year had been realised; not only was their share of the volume of business available insufficient to absorb the overhead charges, but the ruling prices had been below the cost of production. These conditions combined had caused the heavy loss for the year. At home the whole structure of electricity supply and of the use of electric power in industry and on the railways was built up on the work of firms such as theirs. It was a fact that the capital invested in this branch of industry had never yet since its inception received a return in any way commensurate with the benefits which it had conferred on the country as a whole. There was no reason why this should be so except the lack of co-operation amongst manufacturers themselves. Insensate competition could not in the long run supply plant of reliability and technical excellence at a fair and stable price, and they would continue to make every contribution in their power towards a more rational conduct of the industry. No effective co-operative action had yet been taken to curtail additions to productive capacity and the industry must give early consideration to the question.

Their order book at the present time showed a substantial improvement on that of a year ago, but all the benefits of this improvement would not be reflected in the accounts for 1934, since much of the business had only been secured since the end of the year under review. During 1933, orders for steam turbines, oil engines, home railway and hydro-electric material were much below the normal level, for road vehicle bodies and apparatus about the same as the average of the last three years, and for heavy electrical plant appreciably less in value than for 1932. Transformer orders were better than for 1932, but much below the average for the previous three years, and the prices had been really shocking. Switchgear and motor orders were about the average of the last three years. Domestic heaters, cookers, fusegear and meters, were not yet in full production, but some of them had added to the turnover of the year. The outstanding contract of the year was that which they were able to negotiate on behalf of the Metropolitan-Vickers Co. and themselves, with the Polish State Railways for the electrification of the suburban railways round Warsaw. The contract was for the electrification of 200 km. of line and included six sub-stations, eighty motor coach equipments and six locomotives. Their portion of the work would form an important nucleus for their traction factory for over twelve months, and the manufacture of the sub-station equipments would lead to improved conditions in their Stafford works. This electrification would be at 3,000 V d.c., the Copenhagen suburban lines and the Madras suburban lines carried out during the past year being 1,500 V d.c. The Southern Railway

had entrusted them with the order for the motors for their latest extensions. This included 136 motors for the suburban lines and 136 for their high-speed stock. The Railway Co. had asked them to arrange that their motors should be interchangeable with those of Metropolitan-Vickers design, and they had been able to negotiate an agreement with the Metropolitan-Vickers Co. which would put them in a position to meet this requirement.

They had again been entrusted by the B.B.C. with an order for further h.p., d.c. plant for the Northern Ireland transmitter station. This was the sixth regional station to which they had supplied this type of plant. A further order had been received for six water turbo-alternator sets for the Galloway Water Power Co., and substantial orders had been received from the Blackpool Corporation for streamlined tramcars; they also had a number of orders for trolley buses for various parts of the country. An order had been received for some of the largest winding equipment for the South African goldfields, and although the steam turbine business placed was unimportant in amount, they obtained in the latter part of the year, amongst other orders of this type, one for the largest pass-out turbine so far built in this country. It was a 15,000-kW set for Messrs. Edward Lloyd's paper mills at Sittingbourne. The Siemens mercury-arc rectifiers, for which they took out licences some two years ago, had brought some important additions to their order book and rectifiers were being installed in the sub-stations of the Warsaw electric railway system. Their Diesel-electric rail car had been in trial operation on the L.M.S. continuously for about five months, and had given excellent service. They had also completed their Diesel electric locomotive which was suitable for operation in shunting yards.

Telephone Properties, Ltd., held its annual meeting on April 20th, when Sir Alexander Roger (chairman), who presided, said that receipts at £32,978, compared with £54,394, due principally to the new income represented by interest on the mortgage bonds of the Nacional Company, which were acquired in December, 1932, and now served as specific security underlying their debenture stock. Commitments continued to be met by loans from Telephone & General Trust, Ltd., which it was their policy to fund from time to time. This policy avoided the necessity of raising capital in advance and was an economical one. In 1933 commerce in Venezuela suffered from the depression. This had some effect upon the Nacional Company, in which they had a very large investment. The gross receipts of the Nacional Co. represented the equivalent at par of exchange of £198,600, as compared with £218,300 in 1932. This was the first setback in gross receipts for a period of thirty years and should not occasion undue disquietude. The organisation in Venezuela chiefly responsible for that country's telephone service was in a favourable position of being able to fulfil all requirements and to extend service facilities in any direction where it was economically possible to do so. The telephone undertaking celebrated its fiftieth year of supplying telephone service in April, 1933. The remittance of dividends and interest on their Venezuelan investment was satisfactory and they had reason to be hopeful of the future.

The Electric Supply Corporation, Ltd, reports a profit for 1933 of £64,586, as compared with £57,920 for the preceding year. It is proposed to place £3,000 to repairs, renewals, and depreciation, and £3,258 to general reserve. The final ordinary dividend is 7 per cent., making 11 per cent. for the year, and the carry-forward is increased from £23,354 to £27,949. It is proposed to capitalise part of the reserve for distribution to ordinary shareholders on the basis of three new ordinary shares for every ten held. The sales of electricity totalled 17,078,097 kWh, an increase of 40 per cent. These figures include the Petersfield undertaking which was sold at the end of the year. Meeting: April 30th.

Hopkinsons, Ltd., report a net profit for the year ended January 31st last of £13,014, as against £32,524 in the preceding year. A sum of £16,065 is brought in, and after providing for income-tax (£8,221) and preference dividend (£18,375), the amount carried forward is £2,484. No dividend is declared on the ordinary shares (against 2½ per cent. paid as an interim in the preceding year). The report states that during the latter part of the year an improvement in orders both from home and abroad has been evident, and this improvement is being maintained. Meeting: April 27th.

Johnson & Phillips, Ltd., report a profit for 1933 of £75,007, as compared with £56,454 in the preceding year. After deducting debenture interest, &c., the net profit is £37,077, against £21,341, and with £99,058 brought in, the total available is £136,134. Research and development account receives £5,000, and it is proposed to maintain the ordinary dividend at 5 per cent. and to carry forward £101,134. The 6 per cent. debenture stock has been repaid during the year under review and a new issue of 4½ per cent. debenture stock has been made. Meeting: May 3rd.

The North Somerset Electric Supply Co., Ltd., reports a profit for 1933 of £35,177, to which is added £1,881 brought in, £1,754, dividends from subsidiary companies, and interest £647, making £39,459. The ordinary dividend is 7 per cent., less tax, reserve receives £1,000, and £2,014 is carried forward. The sales of electricity totalled 15,476,588 kWh, as compared with 13,607,845 kWh in 1932, and the number of consumers was 11,715, against 9,667.

The Southern Areas Electric Corporation, Ltd., in its first report, covering the period May 9th to December 31st, 1933, shows a net profit of £6,472, of which a dividend for that period at the rate of 4 per cent. per annum absorbs £4,392, leaving £2,080 to be carried forward. The report states that the Corporation now owns or controls the Sussex, Leominster, and Seaton and District companies. Meeting: May 4th.

The Ebonite Container Co., Ltd., reports a net profit for the year ended February 28th last of £8,044, as against £4,673 for the preceding year. No allocation is made to reserve (against £11,199), but the dividend, including the final payment of 8 per cent. now proposed, is increased from 4 per cent. to 10 per cent. The balance carried forward is £5,321.

The Rangoon Electric Tramway & Supply Co., Ltd., reports a gross profit for 1933 of £139,480, to which is added transfer fees, &c., making £144,754. From this is deducted debenture interest, &c., leaving a net profit of £57,295, which with £26,376 brought in, makes £83,670 available. The final dividend is 14 annas per share, making 20 annas, free of Indian tax, for the year, and £22,837 is carried forward.

Pye Radio, Ltd., reports a profit for 1933-34 of £53,863, as against £118,871 in the previous year. To this is added £89,055 brought in, making £142,918. The final dividend on the deferred shares is again 117 per cent., making 125 per cent. for the year. Reserve receives £5,000 and the preferred dividend equalisation fund £1,347, the balance carried forward being £67,634. Meeting: May 1st.

Cables & Wireless, Ltd., has announced a dividend in respect of the year 1932 of 2¾ per cent., less tax, on the preference stock. The annual meeting will be held on May 24th. The company is to change its name to "Cable & Wireless (Holding), Ltd.," while Imperial & International Communications, Ltd., is to become "Cable & Wireless, Ltd."

The Young Accumulator Co. (1929), Ltd., reports that the net profit for the seven months ended March 31st last was £5,686, as compared with a net loss of £5,630 for the year 1932-33, leaving £56 to be carried forward. No dividends have yet been paid. The report states that the profit is due to a considerably increased turnover.

The Atlas Electric & General Trust, Ltd., has announced the usual final dividend on the preference shares. The directors state that the amount required has been met to some extent out of the revenue brought forward from the previous year.

Marconi's Wireless Telegraph Co., Ltd., proposes to pay a dividend of 6 per cent. on the ordinary shares for 1933, against 2 per cent. for 1932. The annual meeting will be held on May 23rd.

Stocks and Shares

TUESDAY EVENING.

THE after effects of the Budget are beginning to make themselves felt in a stiffening of prices of gilt-edged securities in most departments. British Government stocks, T.F.A. issues, industrial debentures, these and other stocks of the first rank are very firm in price. The Government have given a mild hint that money is not likely to become for some time dearer than it is now, and the result is seen in the general strength shown by such stocks as those of the Central Electricity, London and Home Counties, and the West Midlands Joint Electricity issues. No definite information has been vouchsafed up to the present in regard to any probable new issue by the Central Electricity Board. The 3½ per cent. stock has risen to 99 West Midlands J.E.A. fives are harder at 114. In the London Passenger Transport group the "C" stock at 79½ shows a point improvement. Holders of T.F.A. stock are beginning to feel a little uncertain as to how much longer their 4½ per cent. interest will go on in those cases where the borrowers have the right to pay off the loans at an early date.

The Replacement Tendency

The North Wales Power and the Tata Power Companies can redeem their 4½ per cent. debenture stocks, T.F.A., at any date after November this year upon giving three months' notice. The North British Aluminium can pay off its 4½ per cent. issue, T.F.A., at any time after August 1st next year, on six months' notice. In view of the movement that is going on at the present time for replacement by lower-interest issues, of stocks now existent, it would be surprising if some of the T.F.A. descriptions were not to be similarly treated, holders being offered, that is to say, the cash, or, at their option, a security that gives a lower rate of interest. The satisfaction that is felt at the manner in which prices are rising is tempered, of course, by this replacement of one stock with another, the latter paying less interest than the former. Investors, more particularly those who are concerned with modest sums of money, find it extremely difficult nowadays to obtain what they regard, reasonably enough, as a fair rate of interest. The anticipated revival in trade, which was, according to prognostication, to absorb capital in such manner as would tend to lower the prices of stocks and shares in order that money might flow into industry, is still, apparently, some way from being fulfilled.

Home Electricity Supply

Electric Supply Corporation shares have risen 2s. 6d. to 78s. 9d. upon the company's offer of bonus shares. One new share is to be given for every three old shares held. That something of this kind had been expected was manifest from the way in which the price of the shares had been quietly strengthening for some time past. The only change in the group of London shares is a rise of 6d. in South Londons to 37s. Most of the shares in the London supply group now stand between 34s. 6d. and 35s. 6d. At 35s., the yield on the 7 per cent. standard rate of dividend is 4 per cent. on the money. The advance to 37s. in South Londons is suggestive of the possible advance of the list, as a whole, to this higher basis, at which the yield, it may be noticed, is hardly more than 3¾ per cent. on the money. If, as is hoped, the standard rate of dividend were to be increased in respect of the current year to 7½ per cent. the shares, to pay 4 per cent. on the money, would stand at 37s. 6d. For the shares in this group the demand is still insistent, while the supplies of debenture stocks on offer dwindle daily under the constant pressure of absorption by investors.

Provincial and Overseas

Hendon Electrics are better at 55s. The report of the Atlas Company failed to come up to expectation, and the price of the ordinary has fallen 1s. 6d. to 7s. 6d. British Power & Light keep steady at 22s. West Gloucestershire ordinary at 85 has shed a point. The preference is firm at 120. Tokyo Electric 6 per cent. bonds fell to 78, and rallied to 80, which is lower on the week, as a result of the intransigent attitude adopted by Japan in regard to affairs in China.

Victoria Falls ordinary are 1/8 higher at 6⅛, a possible increase in the 20 per cent. dividend being responsible for the support.

Cables and Wireless

Cables & Wireless preferred strengthened to 73½, but the ordinary stocks are dull, the "A" ordinary going back to 22⅛ and the "B" ordinary to 10. The better showing made last month by the usual figures had little effect upon the volume of business passing in the market. Speculation is slightly disappointed at the announcement of a dividend of 2¾ per cent. on the preference in respect of the year 1932. Something better than this had been looked for. Marconi's Wireless is paying 6 per cent. for 1933 on its ordinary shares.

The death of a well-known dealer in this market, who retired a few years ago from active business, took place a few days ago, when Mr. Alexander James Drysdale passed away at the age of eighty. Mr. Drysdale mentioned casually to the present writer, when the cable companies were taken over, and the Cables & Wireless combination came into being eight years ago, that he intended to sell the ordinary stocks to which he was entitled, and to add the money thus realised to investment in the combine's preference stock. Whether he carried out his intention or not we cannot say, but the idea was shrewd enough, as subsequent events have demonstrated. The company is about to replace the cumbersome title of Imperial & International Communications with the handier name of Cable & Wireless.

Marconi Marines hold their improvement at 32s. 6d., and Great Northerns have risen to 38¼. A line of Anglo-Portuguese came on offer at 30s., and promptly found a home. Telephone Properties 6 per cent. debenture can be bought at 105. Reference to the report of the meeting that was held at the end of last week will afford a good idea of the security which covers this debenture stock. The chairman, Sir Alexander Roger, has gone to America for a short holiday.

Stocks that are Wanted

One of the principal Stock Exchange firms dealing in electricity supply issues has prepared a list of stocks, of which they are buyers at good prices. Amongst these there are no fewer than thirty-nine debenture stocks, the demand ranging from 2,000 to £10,000, the great majority being £5,000. An idea of the prices now bid can be gathered from an example or two. For instance, Bournemouth and Poole 4½ per cent. is wanted at 109½, Hendon Electric fours at 103½, North Eastern fives at 110, St. James' 3½ per cents. at 99, County of London fives at 124, and City of London fives at 123. The amounts of stock required, and the prices which are bid, afford as good an illustration as can possibly be given of the manner in which investment presses for gilt-edged securities. The same firm has a list also of preference shares in electrical companies, of which it wants the offer and, to quote an instance or two, 5,000 Westminster 4½ per cent. preference are in request at 23s., a couple of thousand Shropshire sixes at 31s., the same number of Clyde Valley sixes at 31s. 3d., and of Lancashire Electric 6 per cent. tax free preference at 36s. 3d. Consideration of these lists will bring home to the investor the market position. They emphasise the ease with which shares can be sold at good prices and, *ipso facto*, the difficulties that confront prospective purchasers.

Manufacturing and Equipment

Johnson & Phillips have risen to 22s. upon publication of a report that shows an increased profit of £15,700. The figures are decidedly good, the more so in that the company's more recent developments do not seem to have contributed to the improvement in the profits. This implies that there has not been sufficient time for the new sources of revenue to develop as no doubt they will do in the future. The company is again paying 5 per cent. on the ordinary shares. The carry-forward is now £101,000. English Electric preference have strengthened to 10s., the ordinary remaining at 7s. 6d. Callenders are better at 58s. 9d. For the first time in many weeks a recovery has occurred in Brush ordinary, the price, at 40, showing a gain of 5 points. Associated Electrical Industries preference strengthened to 32s. 6d., and Ever-Ready have recovered the slight loss of a week ago. Reyrolles are rather better at 52s. 3d. and Enfield Rolling Mills at 34s. 9d. Ericsson Telephones have shaded off to 72s. Hall's Telephone Accessories are 16s. 6d. and Aron Meters 55s. 9d.

Miscellaneous Matters

Babcock & Wilcox at 42s. show 1/8 fall on the reduction in the dividend. Iron and steel shares on the whole are a better market. There is also noticeable recovery in rubber shares, the reason still being the expectation that some form of restriction is on the point of being announced. Amongst the spectacular movements of the week, a rise of 60 points, to 690, in British Electric Traction deferred stands out conspicuously. The dollar stocks show a rising disposition: American Telephone & Telegraph is up 4 points to 120; International Telephones remain at 14½.

Share List of Electrical Companies

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. Apl. 24.	Rise or Fall	Yield p.c. £ s. d.
HOME ELECTRICITY COMPANIES						
Bournemouth and Poole	1	15	15	77/6	—	3 17 1
Brompton Ordinary	1	7	7	34/6	—	4 1 1
Charing Cross Ordinary	1	7	7	35/6	—	3 19 0
Chelsea	1	7	7	34/6	—	4 1 1
City of London	1	7½	7½	37/-	—	4 1 1
Clyde Valley	1	7	7	42/6	—	3 5 8
County of London...	1	10½	10½	59/6	—	3 11 0
Edmundson's 7% Pref.	1	7	7	34/-	—	4 2 4
Elec. Dis. Yorkshire	1	9	9	48/9	—	3 13 0
Elec. Supply Corporation ...	1	11	11	78/9	+½	2 15 8
Kensington Ordinary	1	7	7	35/-	—	4 0 0
Lancs Light and Power	1	7	7½	38/9	—	3 17 4
London Electric	1	7	7	35/6	—	3 19 0
Metropolitan	1	10	10	53/-	—	3 15 6
Midland Counties	1	7	7	38/9	—	3 12 0
Mid. Elec. Power	1	8	8	42/6	—	3 15 3
North Eastern Electric Ordinary	1	6	6	35/-	—	3 8 7
Do. 7% Pref.	1	7	7	35/-	—	4 0 0
Northampton	1	10	10	56/3	—	3 11 3
Notting Hill 6% Pref.	10	6	6	13⅜	—	4 8 11
North Met. Elec. Ordinary ...	1	10	10	63/9	—	3 2 10
Do. do. 6% Pref. ...	1	6	6	31/6xd.	+6d.	3 16 2
St. James' and Pall Mall ...	1	7	7½	36/6	—	4 3 4
Scottish Power	1	8	8	2⅛	—	3 17 6
South London	1	7	7	37/-	+6d.	3 15 9
Westminster Ordinary	1	7	7	35/-	—	4 0 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	22/-	—	6 16 4
Yorkshire Elec.	1	8	8	49/6	—	3 4 9

	Nom.	1931.	1932.	Price.	Rise or Fall	Yield £ s. d.
PUBLIC BOARDS.						
Central Electricity, 1950–70 ...	Stock	5	5	115	—	4 7 0
Do. 1955–75 ...	,,	5	5	116	—	4 6 2
Do. 1951–73 ...	,,	4½	4½	111	—	4 1 1
Do. 1963–93 ...	,,	—	3½	99	+1	3 10 8
London & Home Counties, 1955–75	,,	4½	4½	110	—	4 1 10
London Passenger Transport, A...	,,	—	4½	118½	—	3 16 0
Do. do. B...	,,	—	5	120½	—	4 3 0
Do. do. C...	,,	—	—	79½	+1	—
West Midlands Joint Elec. 1948–68	,,	—	5	114	+1	4 7 9
TELEGRAPH AND TELEPHONES.						
American Tel. & Tel.	$100	9	9	120	+4	7 10 0
Anglo-Am. Tel. Pref.	Stock	6	6	113½	—	5 5 9
Do. Def.	,,	1½	1½	28	—	5 7 2
Cables & Wireless 5½% Pref. ...	,,	2¾	2¾	73½	+½	3 14 10
Do. A. 7½% Ord.	,,	Nil	Nil	22½	—1	—
Do. B. Ord.	,,	Nil	Nil	10	—½	—
Globe Tel. and T. Ord.	10	Nil	2½	10	—½	2 11 3
Do. do. Pref.	10	6	6	12¾	—	4 13 4
Great Northern Tel.	10	20	20	38¾	+½	5 4 7
Marconi-Marine	1	10	7½	32/-xd.	—	4 13 9
Oriental Telephone Ord.	1	12	12	3½	—	*3 16 10
HOME AND FOREIGN TRAMS, ETC.						
Anglo-Arg. Trams First Pref. ...	5	Nil	Nil	2/-	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	6	—	—
British Electric Traction Df. Ord.	,,	5	5	690	+60	—
Do. do. Pref. Ord.	,,	8	8	157½	—	5 1 7
Brazil Traction	100	—	—	10¾	—¼	—
Brit. Columbia Elec. Rly. Pce. ...	Stock	5	5	103½	+1	4 16 7
Mexico Trams, 5% Bonds ...	—	5	5	19½	—	25 12 8
Mexican Light Common	100	Nil	Nil	8	—	—
Do. 7% Pref.	100	7	7	11	—	—
Do. 1st Bonds...	—	5	5	49½	—	10 10 6
Victoria Falls Ord.	1	15	20	6⅛	+⅛	3 5 2
Yorkshire (West Riding) ...	1	2½	5	1⅛	+⅛	4 14 1
MANUFACTURING COMPANIES.						
Assoc. Elec. Ord.	1	4	3	18/6xd.	+6d.	3 7 7
Do. Pref.	1	8	8	32/6	+⅛	4 18 6
Babcock & Wilcox	1	9	6	42/6	—9d.	2 16 6
British Aluminium Ord.	1	5	5	29/-	—	3 9 0
British Insulated Ord.	1	15	15	68/9	—	4 7 3
Brush Ord....	Stock	Nil	Nil	40	+5	—
Callender's...	1	15	15	58/9	+6d.	5 2 0
Do. 6½% Pref....	1	6½	6½	30/9	—	4 4 6
Crompton Parkinson Ord. ...	5/-	22½	12½	23/6	—	—
Do. 8% Pref.	1	8	8	32/6	+⅛	4 18 6
Edison-Swan 1st Pref.	1	7½	7½	24/6	—	6 2 5
Do. 5% Deb.	Stock	5	5	102½	—	4 17 7
Electric Construction	1	Nil	Nil	13/9	—	—
Enfield Cable Ord.	1	25	25	82/6	—	4 12 7
English Electric	1	Nil	Nil	7/6	—	—
Do. do. Pref.	1	Nil	Nil	10/-	+½	—
Ever Ready	5/-	35	35	29/6	+6d.	5 18 8
Ferranti Pref.	1	7	7	26/-	—	5 7 9
G.E.C. Pref.	1	6½	6½	30/9	—	4 4 5
Do. Ord.	1	8	8	42/6	—	3 15 1
Henley's	1	30	30	6	—	4 17 10
Do. 4½% Pref.	5	4½	4½	5½	—	4 5 9
India-Rubber Preferred	1	—	—	15/-	—	—
Johnson & Phillips	1	5	5	22/-	+⅛	4 11 0
Siemens Ord.	1	7½	6½	18/9	—	—
Telegraph Construction	£1	Nil	Nil	23/9	—	—

*Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parentheses are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1932

10207. "Electric lampholders." J. A. Crabtree. April 9th, 1932. (408112.)

14169. "Electric circuits for television systems." A. H. Buckley. June 18th, 1932. (407951.)

16887. "Electric heating systems for buildings." J. H. Taylor, G. P. Taylor, A. Taylor and K. M. Taylor. June 15th, 1932. (407924.)

17069. "Arrangements for automatically controlling the playing of gramophone records." General Electric Co., Ltd., and H. C. E. Jacoby. June 20th, 1932. (407952.)

20913. "Automatic resistance welding system." E. G. Budd Manufacturing Co., Ltd. August 20th, 1931. (407971.)

26055. "Modulating or frequency-changing systems for radio-signalling and like purposes." F. B. Dehn (C. F. Elwell and F. E. Terman). September 19th, 1932. (407933.)

26056. "Operations of thermionic valves." F. B. Dehn (C. F. Elwell and F. E. Terman). September 19th, 1932. (407934.)

26057. "Variable reactances and circuits including variable reactance." F. B. Dehn (C. F. Elwell and F. E. Terman). September 19th, 1932. (407935.)

26574. "Electrical connectors and in particular electric lampholders." C. R. Cook. September 24th, 1932. (407940.)

26715. "Telephone or like systems." Siemens & Halske Akt.-Ges. September 26th, 1931. (407947.)

26752. "Electrically operated calorific control of gas mixtures." Firth Blakeley, Sons & Co., Ltd., and W. F. Blakeley. September 27th, 1932. (407976.)

26840. "Electric storage batteries." L. Fuller, G. J. A. Fuller and E. W. Sudlow. September 27th, 1932. (Cognate application 35252/32.) (407994.)

26841. "Thief-proof switch locking devices for motor road vehicles." C. O. Lockey. September 27th, 1932. (407967.)

26965. "Synchronous induction motors." British Thomson-Houston Co., Ltd. September 29th, 1931. (407980.)

27106. "Permanent magnets." Swift, Levick & Sons, Ltd., G. D. L. Horsburgh, and F. W. Tetley. September 29th, 1932. (407999.)

27716. "Wireless direction finding systems." Marconi's Wireless Telegraph Co., Ltd., H. M. Dowsett and R. Cadzow. October 5th, 1932. (408015.)

28320. "Electric signalling systems for mines." T. Quick, T. Gough and F. K. Robinson. October 11th, 1932. (Cognate application 8178/33.) (408022.)

28748. "Means for compensating for residual magnetism in Ward Leonard control systems." British Thomson-Houston Co., Ltd. October 15th, 1931. (408027.)

29514. "Protection of the insulating covering of electrical conductors from corona or glow discharge." J. A. Kuyser and Associated Electrical Industries, Ltd. October 21st, 1932. (408033.)

30554. "Housings for electrical switchgear and the like." Igranic Electric Co., Ltd., and A. H. Curtis. October 31st, 1932. (408040.)

32669. "Electric circuits protected by overload devices." Allen West & Co., Ltd., and A. West. November 18th, 1932. (408047.)

33777. "Production of electron-emission-increasing material." Igranic Electric Co., Ltd. December 10th, 1931. (408052.)

34018. "Thermostatic switches." B. R. Wingfield. December 1st, 1932. (408055.)

34544. "Thermionic cathodes." M. Benjamin and H. P. Rooksby. December 6th, 1932. (Cognate application 7367/33.) (408062.)

1933

2165. "Electric circuit-breakers." Allmanna Svenska Elektriska Aktiebolaget. January 23rd, 1932. (408077.)

5339. "Commutators for dynamo-electric machines." A. Tustin and Associated Electrical Industries, Ltd. February 21st, 1933. (408086.)

7223. "Electric discharge tubes." International General Electric Co., Inc. March 9th, 1932. (408092.)

8442. "Attachment of plug sockets or the like to articles such as zinc battery cans." E. Kleinmann and A. Mendel (trading as Kleinman Geb.). March 19th, 1932. (Cognate application 8443/33.) (408095.)

11369. "Electrodes for arc lamps." C. E. Greider. April 18th, 1933. (408099.)

19838. "Apparatus for converting alternating current into high-tension direct current." C. H. F. Muller Akt.-Ges. July 13th, 1932. (408120.)

19992. "Magnetic compasses." Askania Werke Akt.-Ges. Vorm. Centralwerkstatt Dessau und C. Bamberg-Friedenau. July 15th, 1932. (408121.)

21169. "Apparatus for reproducing on incandescent lamp screens pictures derived from cinema films." H. Rosenberg. December 7th, 1932. (Divided application on 34748/32.) (408128.)

22488. "Thermally controlled electrical switches." British Thermostat Co., Ltd., and M. Payne. August 11th, 1933. (408133.)

24726. "Electric braking systems for electric motors." British Thomson-Houston Co., Ltd. September 8th, 1932. (408144.)

25131. "Low-temperature electric heat-radiating panels." Unity Heating, Ltd., and H. Pickett. September 11th, 1933. (408146.)

25619. "Electric welding machines." British Thomson-Houston Co., Ltd. September 17th, 1932. (408148.)

31621. "Alternating current switches incorporating arc-quenching means operating by compressed gas or vapour blasts." Siemens Schuckertwerke Akt.-Ges. November 11th, 1932. (408175.)

34620. "Electrodes for electric welding." British Thomson-Houston Co., Ltd. December 23rd, 1932. (408183.)

34381. "Electron-discharge tubes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. February 6th, 1933. (408185.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from April 18th.

Tenorra (lettering and design). No. 547082. Class 8. Radio receiving sets and parts thereof, and electric batteries and accumulators (not for medical purposes).—Joseph A. Isaacson, trading as the District Gramophone & Wireless Co., 107, Tower Bridge Road, S.E.1.

Dinin Etoile. No. 547466. Class 8. Electric accumulators (not for medical purposes).—La Société des Accumulateurs Electriques (Anciens Etablissements Alfred Dinin), Nanterre (Seine), France. (British representatives: Wheatley & Mackenzie, 40, Chancery Lane, W.C.2).

Abca. No. 548458. All goods in Class 8.—Associated British Cables, Ltd., 51, North John Street, Liverpool.

Novotherm. No. 547861. Class 11. Electrical apparatus (not medicated) for use in diathermic therapy.—Watson & Sons (Electro-Medical), Ltd., 43-47, Parker Street, Kingsway, W.C.2.

Wizard. No. 542786. Wizza. No. 545908. Class 13. Sparking plugs for internal combustion engines.—Wizard Sparking Plugs, Ltd., Waddon Factory Estate, Stafford Road, Waddon, Surrey.

Victorite. No. 548730. Class 40. Insulating material made principally of indiarubber for electric cables.—Johnson & Phillips, Ltd., Victoria Road, Charlton, S.E.7.

Keebush. No. 543272. Class 50. Articles made principally from condensation products of phenol and formaldehyde.—Kestner Evaporator & Engineering Co., Ltd., 5, Grosvenor Gardens, Westminster, S.W.1.

French Electrical Imports and Exports

THE French imports and exports of electrical machinery, apparatus, and goods during the past two years are shown in the appended tables. The values are given in thousands of francs.

IMPORTS

	1932. 1,000 fr.	1933. 1,000 fr.	Inc. or Dec. 1,000 fr.
Dynamo-electric machines and transformers	69,290	63,493	– 5,797
Telegraph, telephone, and other electrical apparatus	233,011	186,037	– 46,974
Dynamo and motor parts	67	14	– 53
Incandescent lamps and radio valves	77,754	70,913	– 6,841
Arc lamps and parts	211	161	– 50
Carbons for electrical and industrial purposes	7,485	7,066	– 419
Electric wires and cables	18,053	45,215	+ 27,162
Parts of electrical apparatus	17,827	16,970	– 857
Magnets other than electro-magnets	1,132	1,631	+ 499
Accumulators and parts	3,735	3,016	– 719
Dry batteries and condensers	14,264	17,393	+ 3,129
Porcelain and other insulators	3,245	3,132	– 113
Total fr.	446,074,000	415,041,000	– 31,033,000
Total at 80 fr. to £	£5,575,925	£5,188,012	£387,913

As will be seen, the imports during 1933 show a decline of £387,913, or nearly 7 per cent. The falling off was fairly general over the various items scheduled, only two (electric wires and cables and dry batteries and condensers) showing an increase. On the export side, the total for last year amounted to £2,857,350, or £448,987 (13.5 per cent.) less than 1932. Of the twelve scheduled items, only three show an increase, the most serious decline being in electrical machinery,

EXPORTS

	1932. 1,000 fr.	1933. 1,000 fr.	Inc. or Dec. 1,000 fr.
Dynamo-electric machines and transformers	51,669	39,046	– 12,623
Telegraph, telephone and other electrical apparatus	91,812	80,550	– 11,262
Dynamo and motor parts	1,051	16	– 1,035
Incandescent lamps and radio valves	18,445	19,346	+ 901
Arc lamps and parts	709	171	– 538
Carbons for electrical and industrial purposes	14,544	12,428	– 2,116
Electric wires and cables	27,639	28,048	+ 409
Parts of electrical apparatus	26,163	16,003	– 10,160
Magnets and other electro-magnets	460	240	– 220
Accumulators and parts	15,982	15,906	– 76
Dry batteries and condensers	3,862	2,776	– 1,086
Porcelain and other insulators	12,171	14,058	+ 1,887
Total fr.	264,507,000	228,588,000	– 35,919,000
Total at 80 fr. to £	£3,306,337	£2,857,350	£448,987

telephone and telegraphic apparatus and parts of electrical apparatus. It will be observed that the latter class also showed the greatest decline on the import side.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Cinema, Kittybrewster; T. Scott Sutherland, 10, Albyn Place.

Ashton-under-Lyne.—Houses (45), Lees Road, Hurst; Wilfred Plant, builder.

Audenshaw (MANCHESTER).—Houses (68); Audenshaw Estate Co. Houses (24), Slate Lane; Kandy Building Co.

Ayr.—Shops, offices and bakery (£11,000), for James Gilchrist, Ltd., Boswell Park; W. Cowie, architect.

Ayrshire.—Primary school, Kilmarnock, and Dalleagles, New Cumnock, for County E.C.; Education Offices, County Buildings, Ayr. Class rooms, gymnasium, staff rooms, &c., Largs School (£9,912), and extensions, Bank St. Public School, Irvine (£17,223); Master of Works, Education Committee, Ayr. Extension to Springside School, Dreghorn (£12,000), and reconstruction of Wallacetown School, Ayr (£5,630), for County E.C.; Wm. Reid, county architect, 14, Wellington Square, Ayr.

Barnsley.—Houses (116), Wakefield Road; Rawson Porter, builder, Upper Sheffield Road, Worsborough Dale.

Bexley.—Houses (92), Normanhurst Avenue, for W. Norman. Houses (60), Rochester Way, for T. C. Brazier. Houses (71), Hill Crescent, for Morris Securities, Ltd. Houses (72), for S. H. Alabaster, Ltd.

Birmingham.—Aerodrome, Meriden; city engineer.

Blackpool.—Houses (700) and shopping centre, Newton Park Estate, Newton Drive; Wilson & Son, 117, Topping Street.

Blandford.—Post Office for H.M. Office of Works; E. E. Boughton, builder, Lytchett Matravers.

Blyth.—Houses (52), Crawford Street (£16,380); borough engineer.

Boston.—Methodist church, Brothertoft Road; Hedley A. Mobbs, architect, 18a, High Street.

Bournemouth.—Houses (198) and shops, West Howe; R. Binnie. Block of offices, Weston Grange; Chine Investments, Ltd.

Bradford.—Houses (112), Bradford Moor, and 300 houses, Calverley; J. H. Naylor & Son, Halifax.

Bromley (KENT).—Cinema, café and shops; G. Coles, architect, Craven Street, London, W.C.

Cannock.—Houses (290), Longford Road; U.D.C. surveyor.

Chelmsford.—Telephone exchange for H.M. Office of Works, King Charles Street, London, S.W.

Cheshire.—School, Newton-by-Chester, for County E.C.; director of education, Chester.

Chichester.—Houses (33); F. C. Nash, Council Offices, North Street.

Cumberland.—School, Brampton, for County E.C.; county architect, Carlisle.

Darenth (NEAR DARTFORD).—Hospital ward to Training Colony (£8,805); Hill & Curr.

Dartford.—Business stores, Spital Street, for the Co-operative Society; Co-operative Wholesale Society, building department, London.

Devonshire.—Fourteen schools in two years for County E.C.; director of education, Exeter. Secondary school, Ilfracombe; county architect, 97, Heavitree Road, Exeter.

Doncaster.—Outpatients' department, Royal Infirmary, and extensions to offices; Walker & Thompson, R.D.C. architects, 7b, Hall Gate.

Dudley.—Houses (2,000); borough surveyor.

Eccles.—Houses (30); borough engineer.

Edinburgh.—Garage extension (£25,000); E. J. McRae, city architect, City Chambers.

Felling-on-Tyne.—Employment exchange for H.M. Office of Works, King Charles Street, London, S.W.

Glasgow.—Houses (64), Clarkston; John Lawrence (Glasgow), Ltd., builders, 50, Wellington Street. Houses (32), Giffnock; R. H. Reid, 65, Viewpark Drive, Rutherglen. Building for the Commercial Bank of Scotland at corner of Bathwall and Wellington Street; J. Miller, 15, Blythswood Square.

Goole.—Public baths, library, and maternity and child welfare centre; borough surveyor.

Hamilton.—Houses (224), Bent Farm site; burgh surveyor.

Harpenden.—Houses (26), Westfield Road; U.D.C. surveyor.

Hinckley.—Re-erection of boot factory, Heath Lane, Earl Shilton (£100,000), for Gidley Wright, Ltd.

Huddersfield.—Employment exchange for H.M. Office of Works, King Charles Street, London, S.W.

Huntingdon.—Houses, Ambury Hill Field; Thackray & Co., Ltd.

Inverness.—Houses (100); Mr. McKillop, clerk.

Irish Free State.—(MULLINGAR, Co. WESTMEATH).—Electric wiring and equipment for building in course of construction. Mental Hospital, for Joint Committee of Management; Delap & Waller, consulting engineers, 16, Molesworth Street, Dublin.

Kensworth (LUTON).—Church, Common Road, for the Methodist trustees; secretary.

Kent.—School, Galley Hill, Swanscombe (425 places), for County E.C.; director of education, Maidstone.

Kettering.—Houses (52), Brook Street; U.D.C. surveyor.

Kilmarnock.—Houses (146); burgh surveyor.

Lanark.—Houses (40), East Maddersmains; Fraser Stewart architect.

Lancashire.—School, Clifton, Swinton, for County E.C.; director of education, Preston.

Leagrave (BEDS).—Houses (20), Garden Housing Estate, for a London syndicate; J. Owen Clover, Harpenden, chairman.

Leatherhead.—Church, Newlands, Epsom Road, for the Congregational trustees; secretary. Council offices, Kingston House Estate; Burnand & Pickett, Wallington.

Leeds.—Employment exchange, Eastgate, for H.M. Office of Works, King Charles Street, London, S.W.

Leicestershire.—Extensions, Wigston Magna Bell Street Council School (£4,330), for County E.C.; J. C. Kellet & Son.

Lerwick.—Houses (50); W. W. Reid, burgh surveyor, Town Hall.

Liverpool.—Exhibition hall, West Lancashire Road; city engineer.

London.—(DEPTFORD).—Dwellings, Bronze Street (£43,000) and Bate Place (£14,000); L.C.C. architect. (EAST HAM).—Tuberculosis and chest clinic (£5,734); borough engineer. (PADDINGTON).—Reconstruction of Prince of Wales Cinema, Harrow Road; J. Stanley Beard & Clare, architects. (PUTNEY).—Houses (20), West Hill; J. Garrett & Son, Ltd. (SHOREDITCH).—Improvement to Hoxton Baths (£3,530); borough engineer. (STOKE NEWINGTON).—Town hall extension (£87,000); J. R. Truelove, architect.

Longbenton.—Houses (70); W. Bean, U.D.C. surveyor.

Lowestoft.—Extensions, New Notley Road School, for Borough E.C.; S. W. Mobbs, architect, Town Hall.

Luton.—Houses (102), Hawthorne Avenue, for H. C. Janes, Ltd. Houses (89), Beechwood Road, for J. G. Calcott.

Macclesfield.—Houses (116), Moss Lane Estate; Gleeson, Ltd., builders, Chesterfield Road, Sheffield. Extensions to factory, Poynton, for E. R. Buck & Sons, Ltd., London Road, Manchester.

Malton.—Houses (50), Highfield Road, Old Malton; J. L. Chapman, clerk to U.D.C., Town Hall.

Manchester.—Extensions and nurses' home to babies' hospital, Slade Lane, Levenshulme (£10,000); Bradshaw, Gass & Hope, architects, 19, Silverwell Street, Bolton.

Margate.—Houses, Palm Bay Estate, for Palm Bay Estates, Ltd., secretary.

Market Drayton.—Houses (28), Grotto Road Estate; W. L. Lind, U.D.C. architect, Trinity Buildings, Hanley.

Markinch (FIFE).—Houses (24); R. W. Todd, burgh surveyor, Hawkerville.

Marlborough.—Houses (26); borough surveyor.

Middlesborough.—Houses (46), North Ormesby; W. E. Schumm, architect, Albert Road. Four-storey extensions, Amos Hinton & Son's premises, Albert Road; A. McLeod, Ltd., builders, Bridge Street, Thornaby-on-Tees.

Mitcham.—Extensions, Empire Works, Mitcham Road; London Capsule Co.

Neath.—Houses (57), Council estates; borough engineer.

Nelson (LANCS).—Houses (35), Pinder Street, by direct labour; borough surveyor.

Newcastle-on-Tyne.—Houses (90), Chapel House Farm Estate; Longstaff & Bain, builders, Denton Road, Lemington.

Newport (I.O.W.).—Houses (22); borough surveyor.

Norfolk.—Central isolation hospital, East Dereham, for C.C.; C. J. Norton, architect.

Oldbury.—Church, Warley Woods (£10,000); Rev. J. C. McCallum, vicar of St. Hilda's Church.

Penicuik.—Houses (72); J. A. Brown, burgh surveyor, Municipal Buildings.

Petersfield (HANTS).—Public offices (£9,500); U.D.C. surveyor.

Queensferry.—Houses (48), at South Queensferry; C. S. Paterson, burgh surveyor, Council Chambers.

Rayleigh (ESSEX).—Methodist Church (£6,300); F. J. Green & Sons, builders, Leigh-on-Sea.

Richmond (SURREY).—Houses (80), Ham, and flats; borough surveyor.

Runcorn.—Church, for Bethesda Congregational trustees; S. Folkard, architect.

St. Helens.—Houses (196), Grange Park, and 64 houses, Rivington Road; A. P. Statham, borough engineer.

Solihull.—Public offices (£19,000); U.D.C. surveyor.

Southend-on-Sea.—Market, with shops, High Street; J. Sumner, Thorpe Bay. Extensions, Rochford Hospital (£400,000), for Corporation.

South Shields.—Houses (236), West Harton; J. Reid, borough engineer.

Sowerby Bridge.—R.C. church, Underbank (£5,000); Byrom & Noble, architects, Bury, Lancs.

Staincross (NEAR BARNSLEY).—Houses (116), Wakefield Road; R. Porter, architect, 1, Clarkson Street, Worsborough.

Standish-with-Langtree.—Houses (42); U.D.C. surveyor.

Stirling.—Houses (54), Linden Avenue, Colquhoun Street; A. H. Goudie, burgh surveyor, Municipal Buildings. Block of shops and offices for Station Hotel (Stirling), Ltd.; Simpson, M'Michael & Davidson, architects.

Stoke-on-Trent.—Houses (210), Burslem; city surveyor.

Surbiton.—Houses (763) and 10 shops, Chessington; Macdonald & Kennedy, Ltd.

Surrey.—Hospital, St. Helier Estate, Morden; county architect, Kingston-on-Thames. Central schools, Tolworth (£11,290), for County E.C.; Thorogood Bros. & Sons, builders, Surbiton.

Swansea.—Houses (22), Dunraven Road; T. & G. Spragg, Ltd. Extensions, General and Eye Hospital; Governors.

Swinton & Pendlebury.—Houses (100); U.D.C. surveyor. Town hall (£65,000); J. A. Adamson, of Bradshaw, Gass & Hope, Bolton, assessor architect.

Tayport.—Houses (44); Allon & Friskin, 26, Castle Street, Dundee.

Twickenham.—Technical institute, and senior school, Kneller; director of education.

Wakefield.—Houses (20), Lupset Estate; and 16 houses, Eastmoor Estate; P. Morris, Town Hall.

Wallsend.—Houses (150), Scrogg Road; W. C. Leech, builder, Coutts Road, Newcastle-on-Tyne.

Wantage.—Houses (62); R.D.C. Surveyor.

Warwickshire.—Extensions, Westlands Girls' School, Rugby, for County E.C.; county architect, Leamington Spa.

Weston-Super-Mare.—Hospital extensions (£7,582); Spackman & Sons, builders, Swindon.

Windsor.—Houses (60); borough surveyor.

Woodside (BEDS).—Houses (250), and shops, Hardy Park Estate; C. W. J. Mathieson, London.

Worcestershire.—Central school, Pedmore Road, Stourbridge, for County E.C.; A. V. Rowe, county architect, Worcester.

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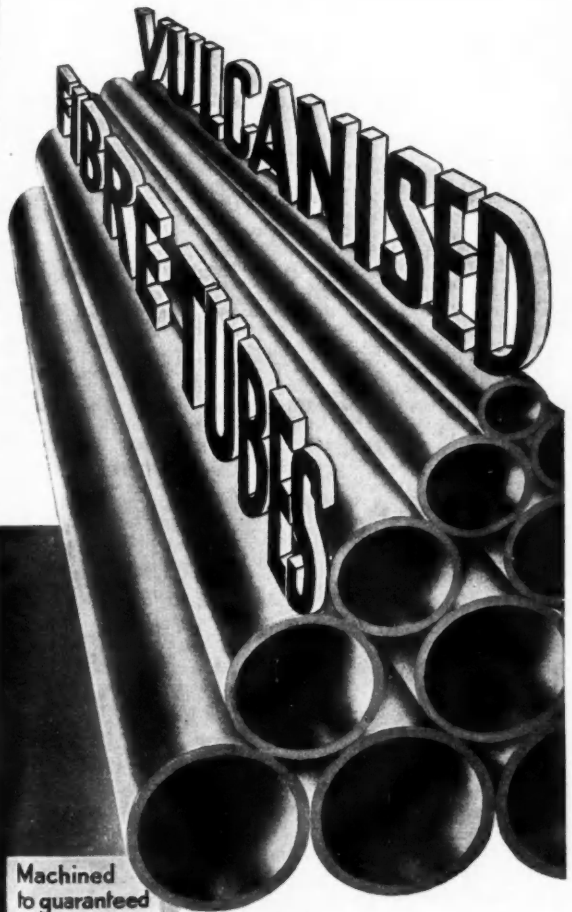

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COMPANY MEETING.

ENGLISH ELECTRIC COMPANY.

Important Contracts Secured.

Mr. G. H. Nelson, Chairman and Managing Director of the English Electric Co., Ltd., presided at the Annual General Meeting held in London on 24th April.

Reviewing the items appearing in the Balance Sheet he stated that the changes were relatively small. Considerable sums had been spent out of Revenue in maintaining and improving the Company's property, and no further provision for depreciation had been made. The liquid resources showed a surplus over current liabilities of £1,233,251.

The trading loss for the year was £175,680. After adding the various items to the debit of Profit and Loss Account and the balance of £9,433 brought forward, there was a debit balance of £277,270 to be carried forward to 1934.

Dealing with the factors which had contributed towards this loss the Chairman said that he had previously drawn attention to the shrinkage in the volume of business and the low level of prices, and that the success of the Company depended on a normal level of capital development at home and abroad. Unfortunately his fears had been realised, and the Company's share in the business available had been insufficient to absorb the minimum overhead charges necessary to keep the technical organisation intact. Ruling prices had been below cost of production.

WORK OF NATIONAL IMPORTANCE.

The steps which the Directors had taken to meet the position had been dealt with in the review of the year's work which had accompanied the accounts. The Company's main activity being heavy engineering was of national importance. It employed a high percentage of skilled labour, and in normal times there was a large demand for its products. Lack of co-operation amongst the manufacturers was the only reason why the industry had not received a return upon its invested capital commensurate with the benefits it had conferred upon the country as a whole. The Directors believed that the present position could be changed with advantage to the industry and to the users of its products. Insensate competition could not in the long run produce plant of unquestioned reliability and of the highest technical excellence.

The Chairman then informed the meeting that some important orders had been received in the later months of 1933 and the early part of 1934 which had contributed to the 80 per cent. increase in the value of orders referred to in the review. The contract with the Polish State Railways was the most important and was the result of a connection with Poland which began more than ten years ago. The Company negotiated the present contract on behalf of the Metropolitan-Vickers Company and themselves. The Company had received invaluable assistance from the British Overseas Bank and were also indebted to the Export Credits Department and other Government Departments for their help and advice. This contract was for the electrification of the suburban railways around Warsaw, comprising 200 km. of line and included six substations, eighty motor coach equipments and six locomotives.

CONTRACT WITH SOUTHERN RAILWAY.

A contract had been received from the Southern Railway for 136 motors for suburban lines and 136 motors for high-speed stock. A further important order had been obtained from the British Broadcasting Corporation for plant for the Northern Ireland Regional Transmitter Station, this being the sixth Regional station the Company had supplied with this type of plant.

The Company had also received a further order for six Water Turbo Alternator Sets for the Galloway Water Power Company. Substantial orders had been placed by the Blackpool Corporation for the Company's latest type of luxury streamlined Tramcars, and orders for Trolley Buses had been received from various parts of the country. Developments in the South African goldfields had benefited the Company and some large Winding Equipment had been ordered. The new development of Mercury Arc Rectifiers had brought additions to the order book. In the latter part of the year an order was obtained from Edward Lloyd's Paper Mills for a 15,000-kW Pass-out Steam Turbine, which would be the largest in this country.

A Diesel electric Rail Car had been in satisfactory trial operation on the L.M.S. Railway. Such cars had a definite field of their own ancillary to full electrification and for working on branch lines.

The report and accounts were adopted. 241

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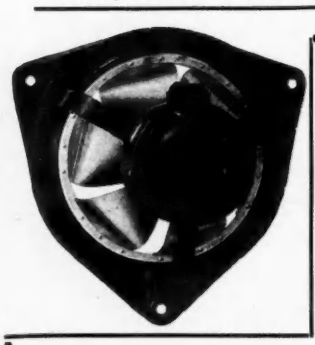

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